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T. A. RICKARD . . . . . EDITOR
FREDERICK HOBART, SAMUEL SANFORD, D. H. NEWLAND. . . . ASSOCIATE EDITORS

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EDITORIAL.

GOLD MINING in Great Britain is still an actuality, as is shown by the St. David mine, in Wales. During March the output amounted to 1,359 tons yielding 1,183 ounces of gold, valued at £5,043; in April, the figures were 1,048 tons for 1,670 ounces, or £7,043, and in May 983 tons were crushed for 2,129 ounces, realizing £8,987. In June the output increased to 978 tons, yielding 2,223 ounces, valued at £9,500. In four months the profits were £25,000. The manager, Mr. H. J. Nicholls, is to be congratulated on the results, obtained at a working cost of £1,260 per month, and the principality has reason to be proud of its gold mine.

BALLARAT STILL stands as a type of the old-fashioned in mining. When a mine possessing an ore-body 60 ft. wide and employing 160 men underground only produces 2,000 tons per month, economy of exploitation is a long way off. Although the mine at Ballarat thus described has been productive for nearly twenty years, the ore is still carried in two-wheeled dump carts for half a mile over bad roads to an old stamp-battery with square stems. It needs no further comment than to say that the mill is only a quarter of a mile distant in a straight line, and down hill. Either machinery agents have lost their persuasiveness in Australia or the manager has accumulated a thick crust of obtuseness. Such examples of unprogressive management are found in some of the best mining districts of Australia, and they merit the criticism which they invite.

TWO YEARS ago, when negotiations were pending for the sale of what are known as Hill lands on the Mesabi iron range, it was given out that Mr. Hill based his selling price on a valuation of $1 per ton for iron ore in the ground. Even in the boom times, that looked like a high price; at present, it looks much higher. Mesabi bessemer ores are selling this season at $3 per ton at Lake Erie docks, while Mesabi non-bessemers have sold as low as $2.40. From these prices are to be deducted the lake freight of 70 cents, dock charges and the rail freight from the mine to Duluth or Superior, so that the operator does not receive over $1.30 to $1.35 for bessemer

ores, and 70 to 75 cents for non-bessemers, out of which must come the cost of mining. As nearly all Mesabi mines are charged with royalties varying from 25 to 50 cents per ton to the fee-owners, the margin for profit to operators who sell their ore does not look large.

AFTER LONG discussion, the producers of potash salts in Germany have signed contracts extending the life of their syndicate from January 1, 1905, to January 1, 1909. The Kali-Verkauf Syndikat has heretofore been disinclined to make any concessions, and at one time it looked as if it would break up. The moving cause for the final agreement was probably the fact that an American interest has secured control of an important property, and was preparing to go on independently. The new agreement makes large concessions to that interest. It may be noted that, in 1903, the exports of potash salts to the United States were 396,244 tons, or nearly one-quarter of the German production.

THE HIGH PRICE of tin for some time past, and the uncertainty whether production will, or can, be increased to meet the growth of demand should call attention to the possibility of substituting some other metal. Of course, there are certain uses to which no other metal can be so well applied, and for these the demand for tin will always exist. A considerable part of the tin imported into this country, however, is used in coating plates for roofing buildings. The so-called tin roof—of tin-coated steel sheets—is in general use in almost all our cities and elsewhere, where flat roofs are found. For this purpose zinc sheets are largely used in Europe, and experience shows that they make an excellent and durable roof covering; they might well be used here, and we believe that such use would be advantageous. It would certainly lessen the pressure for tin supplies, and would also make a market for an increased output of zinc, much to the advantage of producers.

THE DEEP LEAD system of Victoria is in a fair way of being exploited on a scale hitherto unattainable. At the Moorlort and Loddon Valley shafts the pumping plant consists of two 26-in. Cornish pumps, the capacity of which formerly averaged 1,500,000 imperial gallons per day. Under the management of the engineers representing Bewick, Moreing & Company the quantity of water pumped has been increased to 5,500,000 gal. per diem from each of these two shafts; this being equivalent, in one year, as regards unwatering of the gravels, to all the work done since the machinery was installed. The pressure of the water, when originally tapped, was 150 lb. per sq. in., and from this the quantity of water delivered through a 3-in. bore can be readily estimated. It is hoped that the reservoir of underground water will be so diminished in a few months as to permit of exploiting the gold-bearing gravel. It will do much to stimulate this class of mining in Victoria. Mr. Waldemar Lindgren has calculated that there are 500,000 to 1,000,000 tons of gravel per mile of deep lead, the profit to be won being estimated at about $4,000,000 for the Loddon Valley and the Moorlort goldfields together. Many improvements in gravel mining are likely to be developed by the engineering skill required to overcome unusual conditions. Already the system of testing the channel has been improved by the adoption of Keystone drillers, which have now superseded the diamond drill and hand boring hitherto in vogue. Both of the latter gave unreliable results. In pumping, in the handling of large tonnages of gravel, and in the washing of the output there are likely to be improvements, stimulated by the commercial importance of the enterprise.

THE SOUTHERN IRON POLICY.

A fact which seems to deserve notice in recent movements in the iron trade, is the steady working of the blast furnaces in the South. The United States Steel Corporation and the outside producers in the West, who depend largely upon the corporation, have apparently followed no fixed policy, but have blown out, or banked, their stacks, and started up again, as the market fluctuated. The only rule followed—if it can be called a rule—has been to reduce production at irregular intervals, largely for the effect which such restriction might have in helping the effort to maintain prices. Just at present, there is another spasm of reduction, which seems hardly justified by any intelligent forecast of probable trade in the remaining half of the year. It is hardly necessary to say that this costly and fatuous policy has had little effect on the market, and has not frightened any consumers into taking material in advance of their requirements. In fact, it has rather tended to make buyers hold off, in the belief that if the future appeared so unfavorable to the chief producer, outsiders were certainly justified in caution.

We have heretofore referred to the policy adopted by the Alabama iron-makers, and they have since continued to follow it consistently. They have kept their furnaces in blast, and have held their market by reducing prices, to meet the apparent exigencies of the time. The consequence is that, with a steady production, there has been no considerable accumulation of unsold stocks. Profits are undoubtedly less than they were a year ago, but no losses have been incurred in making iron, and certainly none from furnaces standing idle.

The Alabama companies may have some trouble from the dispute over coal miners' wages. All, or nearly all, of them have accumulated stocks of fuel; and it seems now quite probable that the difficulty may be adjusted, and the miners resume work before those stocks are exhausted; so that no stoppages for lack of fuel will be necessary.

Upon the whole, it looks as if the southern furnaces had adopted the "safe and sane" policy, and we hope they will adhere to it. We believe that the results will justify the view they have taken of the question.

EQUIPMENT AND ORE RESERVES.—IV.

The discussion upon this important subject has been revived by the valuable contribution from Mr. G. A. Denny, which we published last week. Our readers will join with us in appreciation of so earnest and thorough a presentation of his views. Such discussion fulfills one of the highest purposes of technical journalism.

Many aspects of the inquiry were touched upon in the letter referred to. One of them calls for present notice. Mr. Denny demurs to Mr. Hoover's suggestion that the banket of the Rand is so uniform in persistence and in the grade of ore that mining finance in South Africa is shorn of all the bristling dangers arising from the vagaries of ore deposition elsewhere. Both of these experienced engineers are right, relatively; for it is altogether a matter of comparison. The reefs of the Rand in their uniform tenor and continuity do somewhat resemble coal seams—more than they do 'gash-veins,' for example, lenses in schist, or pockets in limestone. As compared to these types of uncertainty in ore occurrence they are strikingly regular and calculable; and yet when judged by such a standard of uniformity as a coal seam, the gold-bearing lodes of the Rand vary within margins wide enough sometimes to try the nerves of cautious financiers. Recent events have emphasized this. Bonanza shares fell from £6¾ to £2, because the falling off in the grade of the ore opened up declined so much that the estimated life of the mine was reduced from over four years to about 20 months. This is one of the shares which have been authoritatively considered a certainty, outside the limits of ordinary speculation. On the other hand, the life of Crown Reef has been extended in estimates from seven years' supply of ore for 120 stamps to fourteen years' supply for 240 stamps, simply because previous calculations had only included the material to be obtained from the South Reef and the Main Reef Leader, while later developments have demonstrated that the wider Main Reef itself can be reckoned upon for an exceedingly big tonnage of payable ore. Facts such as these indicate that plans for equipment are likely to be disturbed by the unforeseen even at Johannesburg. Indeed, we

doubt very much if gold mining would have half the zest to the investor if the element of speculation were entirely eliminated, and it is well at all times to emphasize the essential distinction between even the best mining venture and the securities, such as first-class bonds, the safety of which is, humanly speaking, guaranteed. Bonds give absolute safety and a very low rate of interest, mines yield a high return with an inevitable risk; in some cases the risk is small and the return is large; in others, otherwise. Both are equally legitimate as investments. As mining becomes freed from foolishness and develops on a sound basis, mining shares tend increasingly to attract shrewd men because the proportion of risk to return becomes lessened, while in the case of bonds the relation becomes less attractive because the safety remains no greater, and no less, while the plethora of trust funds slowly brings about a fall in the rate of interest receivable.

THE PREVENTION OF MINER'S PHTHISIS.

In order to combat the disease known as miner's phthisis, the Transvaal Chamber of Mines, in October, 1903, invited the submission of methods to lessen the dust, to which the disease is largely due, and appointed a committee of representative professional men to adjudicate the awards which were offered for the best remedy. The judges held their first meeting in March and after twelve sessions they prepared a report, a copy of which reached us recently. It is of general interest to those engaged in mining as the evidence of an earnest practical effort to lessen one of the principal dangers of labor underground. A large number of suggestions were offered and of these only an atomizer and a water drill gained a favorable verdict. The committee decided that all the schemes involving respirators and masks, dust extractors and hoods, jets delivering water inside or at the mouth of the hole, sprays, medical suggestions and other more miscellaneous devices were alike quite impracticable and useless.

Passing on to the successful devices, the principle of the water drills was so well thought of that the committee invited manufacturers to submit complete equipments, the freight to and from Johannesburg being paid by the Chamber of Mines. Of nine who submitted drawings and specifications only two actually competed in the tests, and of these the Leyner drill as a water drill was considered to be decidedly the best for laying the dust, although this service is obtained at the loss of efficiency in actual drilling. The judges recognize that the water drill, by laying the dust at the very point where it is generated, bears the promise of greatly improving the conditions under which miners work and they therefore awarded the second prize to the Leyner drill "in the hope that this award may stimulate manufacturers to further exertions in the direction of the production of a perfected water drill."

Among the atomizers submitted was one by Thos. J. Britten. It was found to lay 75 per cent of the dust in the level where it was tested, it can be used in the various conditions of underground operations and it possesses the advantage of laying the nitrous fumes generated in blasting. The chief drawback—as against many advantages—to this device is the fact that it involves a separate mechanism, which requires extra attention such as miners are disinclined to give. The judges thought it the best practical device submitted and awarded Mr. Britten the first prize.

Of these two methods, the water drill and the atomizer, we look to the former to develop into the best method of combating 'silicosis,' the lung disease due to inhaling sharp-edged rock particles. The atomizer requires a supersaturated atmosphere such as will greatly intensify the debilitating effects of the high temperature encountered in deep mining and it absolutely necessitates a supply of pure water such as is not usually at command. Of course conditions vary and different methods will be required to meet them. In the Transvaal, for instance, the air underground is so dry that there is an impalpable dust which never settles unless a spray is used, while in the Cornish mines the dust from a shot will settle quickly by aid of the natural humidity of the air. It is quite certain, however, that the action taken by the Transvaal Chamber of Mines marks a distinct advance in the solution of the difficulty and we congratulate the public-spirited men who were responsible for this earnest effort to protect the health of miners while at work.

CONDITIONS IN THE CALIFORNIA PETROLEUM TRADE.

The principal point of interest to the petroleum producers of California at the present time is the commercial one; that is, to secure a market for their output at a fair price. In 1903 the oil-wells of the State produced about 10,000,000 barrels more than they did in 1902, making a total of 24,000,000 barrels for the year. It was not possible to dispose of all this in the local market so as to make any profit. About two-thirds of the total output came from the Kern river field, which is in the San Joaquin valley, far inland and therefore dependent on railroad and pipe-line transportation. The oil-men of the Los Angeles field, who have had both railroad and water transportation at their command, rather laughed at the Kern county men, as they got much better prices for their oil than the producers of the inland field; in fact, two or three times as much. Since the Standard Oil Company established its pipe-line from the Kern river field to Richmond, on San Francisco bay, and furnished tank-steamers for ocean service from that port, Kern county oil began to be delivered all along the Pacific coast, and even in Los Angeles itself. As, at the time this service was started, the Los Angeles men were getting about 70 cents per barrel for their oil, while in the Kern river field it was selling for about 20 cents, a chance was offered to deliver the low-priced inland oil to the better market, and it was done. Thus, the Kern county oil began to compete with that from the southern field upon its own territory, and this brought about a vigorous competition. The result is that the market has become very sensitive, and there is a sharp contest, the southern producers struggling to hold their own. Naturally, they are rather indignant at the intrusion, but it is difficult to see anything in the matter, except a fair struggle for trade. The result is not difficult to foretell, as it is not an easy matter for the Los Angeles field, yielding 3,000,000 barrels per year, to carry on a fight with the inland field, with its output of 15,000,000 or 16,000,000 barrels. The smaller district will have to give way, and reduce its prices considerably, as long as the market is confined to the Pacific coast, which, comparatively speaking, offers only a limited outlet. The contest, however, has had a certain reflex action, and has improved the price paid to the Kern river producers.

Meantime the small oil-field of Santa Maria, in Santa Barbara county, continues to prosper, although in that region the cost of drilling and operating wells is higher than anywhere else in the State. This field, however, has the advantage of a local market which absorbs nearly all its output, and the producers have been able to get prices as high as 85 cents per barrel at the wells. It is possible that Kern county oil may find its way there also, but at present there is little or no competition, and the producers continue to drill new wells.

MARKET CONDITIONS.

July 20.

The metal markets show a degree of quiet, which is only natural at this season of the year. Copper has been in fair demand for domestic consumption, considering the season. The foreign demand continues active, and European producers seem to be generally in condition to use a great deal of metal. Exports so far this month are again large.

Tin has shown moderate fluctuations and is generally slightly lower. Lead shows little change, either in demand or prices. There is still some scarcity for spot delivery. Spelter remains firm, with no appreciable change. The Joplin ore miners are generally carrying out the stoppage of production and look forward confidently to higher prices for ore.

The iron and steel markets remain in an unsatisfactory condition. Pig iron prices are

slightly lower, but business is not heavy. There has been some inquiry for long contracts, present prices being attractive to those who look ahead, but furnacemen are not willing to take any contracts running beyond the present year at present figures. In finished material demand has been somewhat variable, orders placed being mainly for moderate quantities for near delivery. For such orders independent mills are competing pretty sharply and generally offering inducements to buyers. They are, consequently, getting most of the business. Several large plants in the Pittsburg district have recently started up, and considerable flourish has been made over this fact, but it looks very much as if the start was mostly for general effect on the trade.

The Western coal markets continue dull, current demand from manufacturing establishments being only moderate.

The seaboard bituminous trade continues quiet, with prices still low.

In the anthracite trade demand is falling off, though shipments from the mines are heavy.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar materials.

The use of water for performing work dates back to an extremely early age, some primitive form of water-wheel having been, in all probability, the first mechanical motor. Thus, in Sicily, a primitive form of impulse wheel, with flat vanes instead of buckets, was introduced by the Saracens, and is still in use.

When so-called water-power is employed in the performance of mechanical work, the real agent is gravity. The fluid is the medium through which the action of gravity is transmitted to the prime motor. Under certain circumstances it is quite possible to use sand, or stones, in a similar matter. Water is most generally employed, because of its greater mobility.

An incidental advantage of the open-hearth steel process over the bessemer process is that it uses up old metal, whereas the latter depends solely on new. Any process which creates a regular market for scrap metal is of importance in the economic history of the world, as it tends to defer the day when our mineral resources shall be exhausted.

According to Dr. Rutherford, radio-active matter seems to be distributed, with a fair degree of uniformity, over the surface of the earth and in the atmosphere. The important question is whether the small degree of radio-activity observed is due to known or unknown radio-elements present in the earth and air, or to a feeble radio-activity of matter in general, which can only be detected when large quantities of matter are present. Experimental evidence is not yet sufficient to answer this question. Many of the metals show a feeble radio-activity, but it is doubtful whether this is due to the presence of a slight trace of the radio-elements, or is an actual property of the metals themselves.

RECENT ELECTRO-CHEMICAL METHODS.[1]

By J. W. RICHARDS.

In the metallurgy of iron, a direct replacement of the ordinary manufacture of pig iron by electrical process is very far from a possibility, even in countries where coal is most expensive and water power most abundant. However, in the manufacture of that higher-priced product, steel, the case is different, and already some of the finer qualities, such as replace crucible steel, are being made electrically in France, Switzerland and Sweden. It is only a question of some more inevitable improvements being made in the electric furnaces used, to make possible the manufacture in them of the more common and cheaper varieties of steel. This will come at first in countries where fuel is dear and power cheap, and afterwards in localities where very cheap power is being generated by gas-engines using either the waste gas from blast furnaces or producer gas made from coal waste or culm.

Even before that time the auxiliary use of electric heating to take off the 'peak of the load,' so to speak, in our open-hearth steel furnaces—that is, to furnish the last few hundred degrees of necessary temperature while the combustion of gas furnishes the lower range—is a distinct commercial possibility. Already our steel works are a network of electrical appliances for running cranes, charging machines, hoists and cars, and the step is not a long one to employ this already-present agent to help the heating gases over the heaviest part of their work, the bringing up of the charge to tapping heat.

Next to iron in natural abundance is calcium, the possibilities of which our chemists and metallurgists are only beginning to appreciate. Occurring as almost chemically-pure calcium carbonate, in inexhaustible quantities and at the cost of only a few cents a ton for quarrying, the question of producing the metal cheaply is the particular task of the electro-chemist. The cost of the metal is practically the cost of its reduction, and there is no doubt that the electro-metallurgist can and will solve this question as he has that of aluminum and silicon. Calcium is, at temperatures above a red heat, the strongest metallic base existing, and is, therefore, the most powerful pyro-chemical reagent. By its use many problems may find their solution, such as the complete deoxidation of melted metals, the reduction of rare elements and many other interesting reactions.

Magnesium does not occur quite so plentifully as calcium, but still it is so common that 99 per cent of the present cost of making magnesium must be charged against the process used and only 1 per cent against the raw material. There is no reasonable doubt but that careful study put upon the electrolytic production of magnesium would result in its being produced at a fraction of its present cost. It is certainly a metal which, at its present price, has very limited uses, but, with a specific gravity of only 1.72, a capacity for being hardened and strengthened like aluminum and the property of forming valuable alloys with copper and with aluminum, it is certain that its cheap production would mean another metal added to those in every-day use.

There is yet another metal of kindred character worth considering. Beryllium occurs in the gem beryl as silicate of aluminum and beryllium. The mineral is found massive in large enough quantities to form a commercial source of the metal. The separation of the beryllium oxide from the silica and alumina is not a very difficult chemical operation, but could probably be simplified by the application of Hall's process of differential reduction in the electric furnace. The reduction of beryllium oxide to metal disolved in a fused bath of alkaline and beryllium salt is a step which would probably yield to investigation, while the collecting of the metal floating upon the bath should offer no greater difficulties than does the collecting of sodium.

With a brilliant white color, specific gravity 1.6, malleable, ductile, forming fine alloys, there are a large number of possible applications for beryllium if it can be obtained cheaply, and it is to the electro-chemist that we must look for the solution of this problem.

In the electrolytic refining of metals, copper was the first to yield commercial results, silver next, then gold, lead and bismuth. Yet there are others awaiting conquest. The electrolytic refining of nickel, zinc, antimony and tin has been attempted, but not yet commercially mastered; that of aluminum is an attractive question because of the economy it would produce. Instead of purifying by costly chemical methods four tons of aluminum ore, we have the alternative problem of refining one ton of impure aluminum, and with a large margin of difference in commercial value to work upon. It may be, since electrolysis in aqueous solutions appears impracticable, that refining in non-aqueous solutions, or in easily fusible salts, would conquer the difficulty.

While our largest electro-metallurgical industry is that of copper refining, the largest industrial electro-chemical operation is that of producing calcium carbide, a substance practically unknown to even the skilled chemist a few years ago, and now being produced by thousands of tons annually; calcium carbide, the commercial key to the gateway first pointed out by Wöhler, when he made artificial urea.

But why only calcium carbide? This is only one of the numerous carbides first produced commercially by electrical methods. Silicon carbide is another which has found broad applications and formed a new industry, and it is not only possible, but most probable, that other metallic carbides may find large applications. Moissan has shown, for instance, that uranium carbide produces, with water, liquid hydrocarbons like petroleum, and the production of artificial petroleum is a scientific possibility, although not at present commercially practicable. Besides the carbides, there are other electric-furnace products—the metallic nitrides, which are awaiting further study and utilization.

Of the possibilities of the direct preparation of metallic compounds from the metals, the transformation of metallic salts into other compounds, the fixation of the nitrogen of the air, the increased application of the simple, direct and elegant methods of electrolytic decomposition, reduction or production in organic chemistry, the electrification of soils and its influence on agriculture, the sterilization of water by electrically made ozone and the disinfection of sewage and their contribution to sanitary science, and the various other unmentioned possibilities of electro-chemistry, time literally fails in a simple endeavor to mention, let alone to discuss them.

[1]Abstract from an address, entitled 'The Continuous Advance of Electro-Chemistry,' by Professor Joseph W. Richards, of Lehigh University.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of the ENGINEERING AND MINING JOURNAL.

CRYSTALLIZATION VERSUS FATIGUE OF MATERIAL.

The Editor:

Sir.—Some weeks ago my attention was called to a remarkable crystallization in round iron tie-rods which, in the service of many months, had been subjected to the fairly strong heat of a reverberatory copper furnace. The specimens warranted attention by reason of the unusual combination of the phenomena, both of crystallization and of 'fatigue of material.'

The tie-rods were originally of 'mild steel.' They are one and one-half inches in diameter. They were subjected to the disintegrating action of heat and tension for about 18 months. They do not indicate from the outside that they have lost absolutely all reliable strength, but half a dozen blows from an 8-lb. sledge breaks them in two, and they often break all the way across and fall apart like glass with a single blow.

On the fractured surfaces several things are to be noted, but the most prominent is the large, bright, flat crystalline surface of cross-fracture. This is as bright as it is possible for an iron surface to be—lustrous in the extreme—brighter indeed than any polished steel that I have ever seen. These large flat surfaces, which are from a quarter of an inch to over an inch in diameter, are covered with the most beautiful and delicate crystalline striations which are at right angles to each other. The surfaces seem in some cases to be merely surfaces, and in other cases they are true plates which still show good ductility, but very slight elasticity. The usual direction of the surfaces and plates is directly normal to the length of the rod; that is, the surfaces and plates show best as basal sections on looking at the rod end-on, though in a few cases they are found parallel to the length of the rod; and in one case a surface was found that was clearly the extension of an old flaw; this was normal to the length of the rod.

The explanation of these basal surfaces and plates may not be ascribed to any one set of conditions and actions—the stable old earth is said by the astronomers to have at least twelve distinct motions or vibrations or oscillations—and it is quite possible that the mechanics of a nail in a wall may be as complicated; but at all events it is feasible to note the practical resultant; viz., that a flat surface of parting has been made normal to the tension.

This is as distinct a phenomenon as the well-known parting and secondary stratification in rocks, produced by heat and pressure, as was well shown years ago in the classic work of Lossen in the rocks of the Plauenschen Grund near Dresden, and by our own lamented Williams in the Baltimore gabbros. It would thus appear possible that in producing what is substantially the same result, either *pressure or tension* may be used, with the attendant heat, in producing secondary crystalline cleaving or parting.

The next point to be noted is that there is, in the altered rod, a longitudinal parting or shearing, and this is not smooth and flat, as is the basal parting, but is irregular and wavy, giving its surface a granular appearance, though in some cases this longitudinal cleavage is seen to have distinct planes which are made up of many small separated surfaces, and these with quite a bright luster, though not comparable to that of the basal partings. There is nothing particularly novel in these longitudinal partings, or in their apparent mode of production, it being well known that longitudinal tension is quite capable of making just such shear surfaces.

The third point to be noticed, and perhaps the first in real importance, is that the substance of the whole rod is disintegrated into a multitude of granules, most of them being about one millimeter in diameter, and having a wavy, oily, brilliant mottled surface, as though they were in turn made up of smaller granules having the same bright, wavy, oily luster. Indeed, in several cases these granules of a considerable fineness can be seen in the best specimens occupying the center of the rod. These regions of very fine granules are of a clear steel-gray, like the common steel fracture, and are invaded by the bright, flat, basal parting and also by the duller longitudinal parting.

Taken as a whole, the decomposed bar certainly illustrates one of the many forms of 'fatigue of material,' and this is a case where the members of the rival 'crystallization' and 'fatigue-of-material' schools may meet on common ground.

It would be interesting to know what function the carbon has taken in this crystallization—whether the flat basal plates and surfaces are composed essentially of pure iron, ferrite—and whether the small amount of carbon, probably as cementite, is grouped along the rectangular striation lines of these flat basal surfaces; and it is hoped that these specimens may shortly be subjected to a careful microscopical and chemical examination. Certainly such alterations cannot but add to our knowledge of the structure and strength of the various forms of iron and steel—an end devoutly to be wished—for the ideal of the union of scientific theory and sound commercial practice is now well under way, as is fully evidenced by our two great American treatises, of Campbell on 'Iron and Steel,' and of Howe on 'Iron, Steel and Other Alloys.'

CHAS. S. PALMER.

Anaconda, Mont., July 15, 1904.

PYRITE SMELTING.

The Editor:

Sir.—Being interested to some small extent in copper mining, I have read with great pleasure some of the discussion on pyrite smelting, and recalling some of my experience of bygone years in blast-furnace work, it has occurred to me that where fuel oil can be obtained at a reasonable cost it would furnish not only a convenient means of experimenting on the amount of extraneous fuel required with different varieties of ore, but also a safeguard against chilling, as in Mr. Mathewson's work; the supply of oil can be adjusted so as to furnish either a reducing or an oxidizing flame, and any irregularities in the working of the furnace can be met as soon as perceived, instead of having to await the working down of the extra fuel with the stock from the furnace top.

I recollect on one occasion having five out of the seven tuyeres of a charcoal blast furnace closed permanently by a succession of slips when working on a very dusty, highly aluminous, brown hematite ore; everything looked fair for a regular freeze-up, as we had been having trouble before and were in no shape to meet this additional mishap. I had some oil blow-pipes fixed up at once, and in 36 hours had my tuyeres all bright again, and the iron notch in good shape, it having frozen up solid. This was done with about three-fourths of a barrel of oil, and the furnace saved from freezing solid. If the price of oil admitted of doing so, the additional fuel required might be altogether supplied in this way; as the oil blow-pipe can be easily adjusted, so as to form a permanent attachment to the tuyere, without interfering with the line of sight from the 'peek-hole,' to any inconvenient degree. Of course in the case above mentioned the tuyeres had to be removed, but in ordinary cases of chilling I have not found it necessary.

S. DILLON-MILLS.

Toronto, Canada, July 6, 1904.

IRON SOWS IN PYRITE SMELTING.

The Editor:

Sir.—In reference to the formation of iron sows in pyrite smelting, covered by the article of Messrs. Fulton and Knutzen (*Transactions* American Institute of Mining Engineers, 1904), and later quoted and confirmed by Dr. Peters in the ENGINEERING AND MINING JOURNAL of July 7, 1904, we think perhaps a few observations and suggestions may not be out of place, as it does not seem to us that the conclusions reached by these gentlemen can be correct.

They state that metallic iron is formed by an *oxidizing action,* the FeS_2 being changed first to FeS and FeO, after which these react;

$$FeS + 2FeO = SO_2 + 3Fe.$$

That an oxidizing action is prevalent in the pyrite furnace is undoubted, but it is well known that the reaction given will not take place. M. N. Bolles (*Transactions* A. I. M. E., 1904) states that "copper bottoms may be obtained by the reaction,

$$Cu_2S + 2Cu_2O = 6Cu + SO_2,$$

but that the result cannot be obtained in the case of a ferrous matte, as was demonstrated by the fusion of varying mixtures of raw and roasted matte." Percy makes a similar statement, and Dr. Carpenter and others have made numerous experiments in the same line, with uniform results in the failure to obtain metallic iron. It seems that the Fe has too strong an affinity for the S, and refuses to give it up, in which it differs from the copper reaction. That Fe has a greater strength of affinity than Cu is indicated also by the ease with which it takes the sulphate group from the Cu in the manufacture of cement copper:

$$Fe + CuSO_4 = FeSO_4 + Cu.$$

And even if metallic iron *were formed,* it is impossible to imagine its permanent existence as such at the high temperature of the furnace, when surrounded by the very active agent, oxygen, to which it owed its existence. In fact, there seems to have been nothing very substantial upon which Messrs. Fulton and Knutzen base the theory of the production of metallic iron by an oxidizing influence, save that both were evident in the furnace, and it was assumed that one produced the other, irrespective of the fact that it was "paradoxical," as they state. Relative to Dr. Peters's

finding several hundred pounds of sow in the bottom of a furnace after a trial of smelting fine raw sulphides without carbonaceous fuel, is it not possible that some coke from previous runs was entangled in the bottom of the furnace, remaining there, and reacting in accordance with our theory following?

Our idea as to the existence of metallic iron is based upon what we believe to be very good evidence, secured by some ten years' experience in active charge as foreman of the furnaces at Deadwood, during which time we believe that plant held all records for the manufacture of iron sows, many of them reaching 40 tons weight in one solid mass, regardless of the many experiments made with a view of preventing their formation; this followed by experience gained when in charge of furnaces at Florence, Buena Vista, and Golden, Colorado, and all checked up by the results obtained at other plants lately visited by us, including those at Ducktown, Tenn., Bingham Junction, Utah, Butte and Anaconda, Mont., and the Granby and Greenwood plants in the Boundary district of British Columbia. At Deadwood, where conditions were most conducive to sow formation, a small quantity of matte carrying 15 to 30 per cent copper was made, representing a concentration of forty to fifty tons of charge into one ton of matte. The slag carried 50 to 60 per cent SiO_2 and Al_2O_3, whereby a high percentage of fuel (16 to 18) was required. The following are our observations and conclusions in brief:

1. Matte at Deadwood always carried metallic iron.

2. Increased coke charge caused increased quantity of sow.

3. Increased blast caused increased quantity of sow.

4. Increased matte-fall caused an apparent decrease of quantity of sow, and furnace bottom filled high with sow could be burned out and lowered by heavy matte fall, the metallic iron being carried off by the matte.

5. Sow not formed if much ZnS in charge, and no metallic iron in matte under similar conditions (indicated at Buena Vista). There is always sufficient ZnS in the matte to react with any Fe present, forming FeS and Zn, the latter volatilizing and passing off, the fumes being noted when a fresh pot of matte was drawn.

6. Pieces of unconsumed coke often found in sow, completely encased in a cellular mass of metallic iron. We have an excellent specimen resembling a cross section of an ear of corn in size and shape, the coke being about 1¼ in. diameter, imitating the cob, and the sow surrounding it with a thickness of about ½ in., imitating the corn, the whole piece being about 2¼ in. diameter. Numerous holes and cells in the sow make it somewhat cellular, some holes extending from the outside surface to the coke within. Before this piece was broken across, the coke was completely encased by the sow.

From this, and other evidence, we draw the conclusion that *coke alone is responsible for the formation of sow,* and where the slag is silicious, and the high temperature required is secured by means of a heavy coke charge, sow is unavoidable (here is another case in which hot blast should be of advantage,—it was never tried at Deadwood); but that a large quantity of matte will carry it off, holding metallic iron entangled therein; or ZnS will throw it back into matte. Sow cannot be formed, and cannot exist in the oxidizing atmosphere above the tuyeres, but is formed *in the crucible,* beneath the surface of the mass of slag and matte, beyond any possibility of oxidizing influences, by a reaction between coke and matte, the former having come down with the charge, unconsumed, and being held beneath the surface of the matte by the weight of the superincumbent charge, oxygen not being required for the reaction:

$$C + 2FeS = 2Fe + CS_2.$$

The carbon disulphide is a gas above a temperature of 46° C., and naturally escapes to the surface of matte and slag, thence coming into contact with oxygen from the blast, and burning actively

$$CS_2 + 3O_2 = CO_2 + 2SO_2.$$

The Fe retains the gold originally held by the matte from which it had its origin, and is either dissolved and carried off by an excess of matte, or, in a dearth of matte, sinks into the brickwork of the furnace bottom, replacing it molecule by molecule; or, it remains surrounding a piece of coke too large to be entirely decomposed by the matte, since the coke will remain *in statu quo* when completely encysted with iron, as the specimen above described.

By the reaction quoted, 1 lb. of coke will throw out 9.33 lb. of metallic iron, from which it can be seen that even such small pieces of coke as issue from the tap-hole occasionally may give a great deal of trouble if they should remain in the crucible.

Increased blast causes increased amount of sow by more coke getting down into the crucible on account of the faster running of the furnace.

JAS. W. MYERS,
E. C. REYBOLD, JR.

Denver, Colo., July 15, 1904.

ON FEED-WATER HEATERS.

The Editor:

Sir.—In your issue of June 23 you have an article on 'A Home-Made Boiler Feed Water Heater,' which is in use somewhere in Mexico.

Some of the statements of this correspondent are open to criticism. In the first place, this is not a new idea in the construction of heaters. It is identical in detail, even including the rocks, with the heater built and patented by the Llewellyn Iron Works of Los Angeles, California.

The statement that from 50 to 75 per cent of the steam is condensed is palpably erroneous. There are about forty different feed-water heaters on the market, and none of them dare make such a claim in a catalogue—and any engineer knows the manufacturer is not at all bashful when it comes to making claims.

The second statement, that a good boiler feed-water heater saves from 25 to 40 per cent in fuel, savors of exaggeration. All books on steam engineering have a table giving the per cent saved in fuel, by heating the feed-water. The initial feed-water temperature is given from 32° F. upward, and the final temperature up to 250° F. These results are as patent as the laws of gravity. The per cent saved in fuel by heating the feed-water, is obtained in a simple way. There are 1146.6 units of heat in 1 lb. of steam at 212° F. A unit of heat is the amount of heat required to raise the temperature of 1 lb. of water one degree. Approximately every 11° of heat added to the feed-water means 1 per cent saved in fuel. Then to save 40 per cent in fuel, the feed-water would have to be fed to the boiler at a temperature of not less than 440°.—a temperature belonging to steam at approximately 384 lb. boiler pressure. Suppose we had the most favorable conditions possible to effect the greatest saving by the installation of a feed-water heater. The initial temperature of the feed-water would be 32°, just at freezing point. The temperature of the exhaust from an ordinary high-pressure, slide-valve engine is 230°. Suppose the feed-water is raised to that—which is never done—the feed-water has then been raised 198°; this, divided by 11, equals 18. Thus there is only 18 per cent saving in fuel under the most favorable circumstances. The average temperature of the feed-water, unheated, is 60°. The ordinary feed pumps do not handle the water over 170°, so the increase of the temperature is 110°, representing a saving of 10 per cent in fuel. This is considered a good average and should be satisfactory to any user of steam.

While on the subject of feed-water heaters, a little discussion of the merits of the open and the closed heaters may be useful. The closed heaters are all cylindrical in form, generally made of ¼-in. sheet steel. Inside is a series of brass tubes, about 1 in. in diameter. The feed-water is generally pumped through the tubes to the boiler, and in some cases it is on the outside. The results are the same. The exhaust steam never comes in contact with the feed-water. There is no attempt at purification, so the heater and boilers soon become incrusted with scale, if there is any tendency toward that terrible trouble, from the feed-water. The closed heater, when filled with scale, is more difficult to clean than the boiler. There are many difficult pipe connections to open up, and the scale can only be removed from the small brass tubes by many hours of drilling. In many cases the closed heater merely displaces the troubles of cleaning without decreasing them. The closed heater can supply the boiler with water at a temperature of 212°, as the water passes through the feed pump before it is heated. There is not one closed heater, however, out of a dozen that does this continuously. From the moment scale begins to form in the tubes, their heating efficiency decreases. One-sixteenth of an inch of scale reduces the temperature of the feed-water 13 per cent. In many cases the writer has found the feed-water going to the boiler from closed heaters at a temperature below 100°, and the heaters were cleaned out every month or two. The conclusion reached from the foregoing is that a closed heater is undesirable unless the feed-water is absolutely free from the usual impurities which form scale.

In the open heater is found a greater variety of construction. It would take too much space to enter into a detailed discussion of each type, but they all use a few common principles. In the first place, the exhaust steam is thrown in direct contact with the feed-water. The water condenses a certain proportion of the steam, the general ratio being 7 lb. water to 1 of steam. This condensed steam and water falls to the bottom of the heater, flowing thence to the feed pump. From the pump the water goes direct to the boiler.

Nearly all manufacturers of open heaters claim to feed the boilers at 212°, and to keep out the scale. This is only possible under certain conditions, and as constructed, few open heaters meet these requirements. There

is not one feed pump out of a hundred which will work smoothly with the water over 170°. Even should the water reach the pump at 212°, the temperature will be reduced at least 10° in passing through the pump, and to the boilers. If the water remains heated to 212° in the heater, it must be in a state of agitation, and the impurities which form scale will not settle, but will pass through the pump to the boiler.

The methods of separating the lubricating oil incorporated in the exhaust steam are also various. Some use rocks, in the middle of the heater, as described in the article on June 23. Others use excelsior, packed in the settling chamber. Both of these methods are poor makeshifts, but answer the purpose in the absence of more efficient arrangements.

As both the open and the closed heaters have their advantages, why not construct a machine combining the best features of each type? The writer recently discovered such a machine at the Troy Laundry, at Los Angeles, Cal. From the exhaust inlet to the pump, it is an open heater. From the pump to the boiler it is a closed one. The exhaust is forced downward, and not upward; its direction is changed a number of times, then thrown into a hot well, which is the most perfect oil trap yet invented. The settling chamber is from 2 to 3 ft. wide, and from 5 to 10 ft. long, according to the capacity of the heater. This gives ample space for the complete cessation of all agitation, and allows the precipitation of sediment, and reduction in temperature of the water to 160°, so that it can easily pass through the pump. From the pump, the water passes, purified, to the upper chamber of the heater, where it circulates in the super-heating coil, until it reaches a temperature of 212°, thence to the boilers. The machine appeared to me to be simple, yet the most efficient of any I have seen. Any good engineer will endorse this heater in thirty minutes, and then wonder why he did not take out patents on the idea himself, as there is nothing particularly new in it. It is the combination that makes the perfect device.

GARNER CURRAN.

Los Angeles, Cal., July 7, 1904.

BRITISH EXPORTS OF MINING MACHINERY.—Exports of mining machinery from Great Britain for the six months ending June 30 were valued at £359,999 in 1903, and £439,333 in 1904; an increase of £79,334. Of these exports a total valued at £160,836 in 1903, and £210,935 in 1904, went to South Africa, the increase in this item being £50,099.

NICKEL IN AUSTRALIA.—In a recent issue the *Australian Mining Standard* says: "It is not a little remarkable that nickel, so abundant in New Caledonia, has, up to the present, been found among the Australasian States only in Queensland and Tasmania. In the State first named it has been identified as a rare occurrence of scientific interest, but of no economic value. In Tasmania the known deposits of nickel ore are on a larger scale, and 136 tons, valued at £554, were exported in 1894. Trial Harbor, on the west coast, to the north of Macquarie Harbor, is the place from which it was obtained, and recent prospecting near the old Meteor mine has led to the discovery of nickel ore in workable quantity. Beyond what has been done in Tasmania, no attempts have been made to systematically prosecute the search for this valuable metal."

CHINESE IN SOUTH AFRICA.

It may interest our readers to know something of the terms of the Convention between Great Britain and China with regard to the immigration of Chinese coolies into the Transvaal. The arrangements for indenture are covered by Articles 7 and 8, which say:

"Art. 7. Every indenture entered into under the present articles shall clearly specify the name of the country for which the laborer is required, the duration of the engagement, and, if renewable, on what terms, the number of hours of labor per working day, the nature of the work, the rate of wages and mode of payment, the rations, clothing, the grant of a free passage out, and, when such is provided for the indenture, a free passage back to the port of embarkation in China for himself and family, right to free medical attendance and medicine, whether in the Colony or Protectorate, or on the voyage from and to the port of embarkation in China, and any other advantages to which the emigrant shall be entitled. The indenture may also provide that the emigrant shall, if considered necessary by the medical authorities, be vaccinated on his arrival at the depot, and, in the event of such vaccination being unsuccessful, revaccinated on board ship.

"Art. 8. The indenture shall be signed by the emigrant in the presence of the Chinese Inspector or his delegate, and of the British Consular Officer or his delegate, who shall be responsible to their respective Governments for its provisions having been clearly and fully explained to the emigrant previous to signature. To each emigrant there shall be presented a copy of the indenture drawn up in Chinese and English, and signed, or in cases of illiteracy marked, by the emigrant after the Chinese manner. Such indenture shall not be considered as definite or irrevocable until after the embarkation of the emigrant."

Free access to courts of justice is accorded by Article 9:

"Art. 9. In every British Colony or Protectorate to which indentured Chinese emigrants proceed, an officer or officers shall be appointed, whose duty it shall be to ensure that the emigrant shall have free access to the Courts of Justice to obtain the redress for injuries to his person and property, which is secured to all persons, irrespective of race, by the local law."

Repatriation is safeguarded by Articles 11 and 12:

"Art. 11. With regard to the repatriation of the emigrant and his family, whether on the expiration of the indenture or from any legal cause, or in the event of his having been invalided from sickness or disablement, it is understood that this shall always be to the port of shipment in China, and that in no case shall it take place by any other means than actual conveyance by ship, and payment of money to the returning emigrant in lieu of passage shall not be admissible.

"Art. 12. Nothing in any indenture framed under these articles shall constitute on the part of the employer a right to transfer the emigrant to another employer of labor without the emigrant's free consent, and the approval of his Consul or Vice-Consul; and should any such transfer or assignment have taken place, it shall not in any way invalidate any of the rights or privileges of the emigrant under the indenture."

The Chinese Government gets a fee for each coolie; this is covered by Article 13, which says:

"Art. 13. It is agreed that a fee on each indentured emigrant shipped under the terms of this Convention shall be paid to the Chinese Government for expenses of inspection; but no payment of any kind shall be made to the Chinese inspector or any other official of the Chinese Government at the port of embarkation. The above fee shall be paid into the Customs Bank, previous to the clearance of the ship, and shall be calculated at the following rate: Three Mexican dollars per head for any number of emigrants not exceeding 10,000, and two dollars per head for any number in excess thereof, provided they are shipped at the same Treaty port, and within the space of 12 consecutive months."

The Convention is to be in force for four years, and is then terminable on a year's notice from either party.

THE ENGINEERING BUILDING.

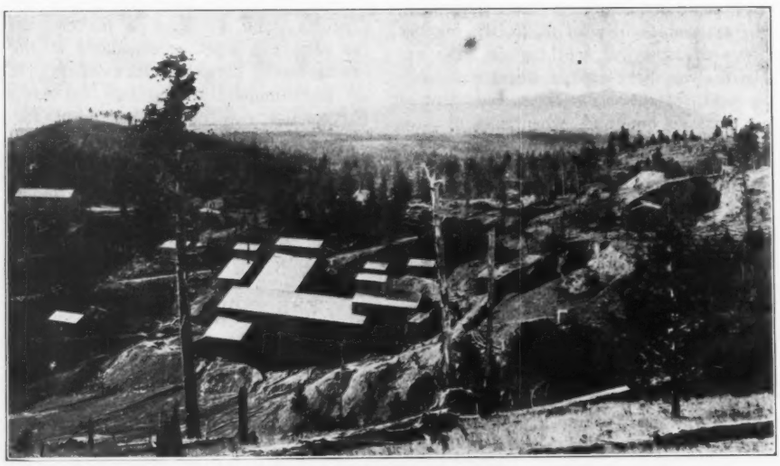
The committee of the three national engineering societies and of the Engineers' Club has made the selection of architects for the United Engineering Building and the Engineers' Club. The competition was a mixed one; in addition to selecting six competent architects, the committee threw the work open to all comers and gave prizes to the best competitors in the open class. The committee received 26 complete sets of competitive plans for the two buildings, inclusive, comprising over 500 drawings. The assistance of Prof. W. R. Ware as expert adviser was obtained and all of the designs were considered. The successful competitor for the United Engineering Building is Mr. Herbert D. Hale, of Boston, with Henry G. Morse, of New York, as associate architect. Mr. Hale has done a large amount of public architecture in New England and has constructed some Carnegie libraries, besides doing work for the New York Shipbuilding Company. The successful competitors for the Engineers' Club are Whitfield & King, of New York, who have done a large amount of work in New York City and who were also associated in work on the buildings of the Pan-American Exposition. The designs of this firm were also among those favorably considered for the United Engineering Building, awarded to Mr. Hale. The successful competitors in the open class for four equal prizes of $400 each, in addition to Mr. Hale, are: Trowbridge & Livingston, of New York; Frank C. Roberts & Company, with Edgar V. Seeler, associate, Philadelphia, and Allen & Collins, of Boston.

The United Engineering Building will occupy 125 ft. front by 100 ft. on West Thirty-ninth street, while the Engineers' Club, with a frontage of 50 ft. and a depth of 100 ft., will face on Bryant Park and the new Public Library. The United Engineering Building, aside from quarters for the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Institute of Mining Engineers, as well as other societies which will share in the accommodations, will have several fine auditoriums and a magnificent library. The club building will be 11½ stories high, with the usual accommodations of a club and some 60 or 70 bedrooms or members. The work of tearing down the old buildings and the construction of the new will begin shortly.

THE MINES OF JUDITH BASIN, MONTANA.

BY OUR SPECIAL CORRESPONDENT.

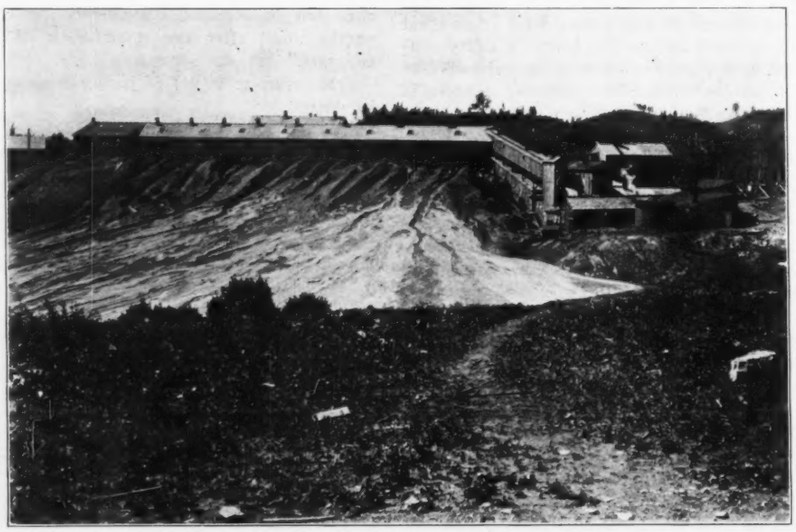
Lewistown, in Fergus county, Montana, is now reached by the line of the Montana Railroad Company, which was completed last year from Lombard, on the main line of the Northern Pacific, to Lewistown, a distance of 157 miles. Lewistown is on a small tributary of Judith river, which flows northerly into the Missouri, draining Judith basin. This basin is approximately 100 miles in diameter and is bounded on the south by the Snowy range, on the west by the Belt mountains, with the Judith and Moccasin ranges on the east and north. In the North Moccasin range is the Kendall mining district, within which are the Kendall, Barnes-King and other mines; in the Judith range is the Gilt Edge district, where are situated the mines of the Chicago-Montana Company, controlling the old Whiskey gulch mines, those of the Gold Reef Mining Company, and others. The Kendall district is 20 miles from Lewistown; the Gilt Edge, 18.



KENDALL MINE AND MILL, MONTANA.

The mine of the Kendall Gold Mining Company is controlled by Finch & Campbell, of Spokane, and is under the management of H. H. Lang, at Kendall. The property is paying dividends of $25,000 per month, having maintained this rate for several years. The mine is developed by open-cuts and by a 500-ft. incline shaft, with levels at regular intervals. The vein strikes northeast-southwest along a lime footwall, the hanging wall blending into the shales and sandstones. A dike of porphyry cuts through the vein at right angles, and the richest ore is on the contact of the lime, shale and sandstone with the porphyry. At the 200-ft. level the vein has an average width of 125 ft., with a dip of 65°; a stoped-out chamber is 160 ft. wide and four sets high, and from this level the workings are continuous to the surface. The ore is a quartz-porphyry, containing 77 per cent silica and 3 per cent iron, with principal values in gold, there being but a trace of silver. It is well suited to cyaniding, 300 tons per 24 hours being treated by that method. The ore is crushed to ¼-in. size before placing it in the leaching vats, each of the latter being 22 ft. square and 8.5 ft. deep, constructed of steel, 12 in number, holding 170 tons each of dry ore. Seven days are required for leaching; 3 lb. of cyanide per ton of water is used as strong solution, this being followed with a weak solution in which 1 lb. cyanide per ton of water is used, and finally by a wash of fresh water. In precipitation by zinc shavings the consumption of zinc amounts to 0.33 lb. per ton of ore treated. The ore, as fed to the mill, averages $6.50 per ton, the extraction amounting to 90 per cent. Mr. Lang states that the cost, including mining, milling and development, averages below $2 per ton of ore treated. Everything is run by electric power and a force of 75 men is employed.

The Barnes-King Mining Company's mine is on the same ore zone as that of the Kendall. The Barnes-King, however, is wholly within the lime, the vein being about 30 ft. wide, with a dip of 35°. It is opened by surface cuts and a 270-ft. shaft. The collar of the shaft is 200 ft. below the apex of the vein. From the 100-ft. station an 800-ft. drift has been driven; a 600-ft. level has been run from the 200-ft. station. A 200-ft. winze has been sunk in ore from the 200-ft. level. The ore comprises altered lime with some sandstone. The values are in gold, with a trace of silver, amounting to an average of $9 per ton. The gold is extracted by cyanide, and it is stated that the extraction amounts to 92 per cent. Thus far, the ore is well oxidized and there are few unfavorable conditions. It is found necessary, however, to mix the sandstone and lime ores in the vats to overcome the free slacking of the latter. Superintendent H. I. Shaw states that they use 0.3 lb. of cyanide to the ton of ore and that the consumption of zinc in precipitating amounts to 25 lb. to the ton of ore treated. E. W. King, one of the stockholders, is manager of the company. The mill is handling 160 tons of ore daily. The Golden Discovery group and others are being developed on the same general belt.



KENDALL MILL, MONTANA.

PIG IRON PRODUCTION IN GREAT BRITAIN.—The number of blast furnaces reported active in Great Britain on June 30 was 329. The estimated production of pig iron for the half-year ending June 30 was 4,218,000 long tons.

OIL WELLS IN JAPAN.—American methods have aided materially in developing the oil industry in Japan. The first modern boring machinery was introduced in the Amaze field, in 1871. Seventeen years later, in 1888, the Japan Petroleum Company, capitalized at 150,000 yen (since increased to 1,200,000 yen, or $597,600) was formed, to operate in the oil-fields of Echigo on the American system. In the last financial year this company paid a dividend of 45 per cent. The great success of the Japan Petroleum Company initiated a boom, and in the two years from 1890 to 1892 more than 200 oil companies, mostly speculative, were organized in Higashi Yama. In 1893, the Hoden Oil Company, capitalized at 25,000 yen, was organized. In nine years the capitalization of this company was increased to 1,500,000 yen ($747,000), and in March, 1902, it acquired control of 14 oil companies, three refineries, three pipe-line companies, and 10,000 acres of proved oil land in the Echigo field. The company is operating 244 wells, has 32 miles of pipe line, 84 tank cars, gives employment to 1,184 men, and produces daily over 50,000 gal. refined oil. Another large consolidation is the International Oil Company, organized in 1900, with property in Kasuga Shinden, in the suburbs of the city of Naoyetsu, the terminal of the Hoku-Yetsu and Slim-Yetsu railways. The International's present share capital is 10,000,000 yen ($4,980,000). The daily capacity is 120,000 gal. refined oil.

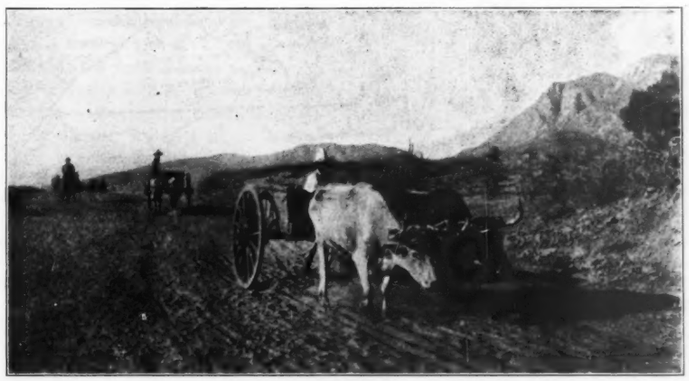
COPPER DEPOSITS IN SINALOA AND SOUTHERN SONORA.

By Forbes Rickard.

Within one hundred miles of the Pacific coast of Mexico and within easy reach of the Stilwell railroad (Kansas City, Mexico & Orient), there is a mining country which at this time is attracting much attention.

In the desire to contribute to the sum of general information respecting this interesting region, I have put together the notes and impressions gathered during a recent visit to the locality bordering upon Sonora and Sinaloa, to which the old town of Alamos is headquarters.

Speaking broadly, this part of Mexico is destined to be the field of more important mining enterprises than have been developed up to this time; in common with a great many other mining districts, which are relatively easily reached, it has been injured by the questionable methods of irresponsible promoters. In so many cases the misrepresentations of these men have given the mine owners themselves an exaggerated idea of their property, that it has been difficult to bring mining enterprises to a business basis. I believe also that many good veins have been sacrificed to the ruinous policy of sorting out a little 'dab' of high-grade ore at the expense of the great bulk of lower-grade veinstuff. This is the way of the *gambucino,* the human mine-gopher—who corresponds to the tributor of other countries.

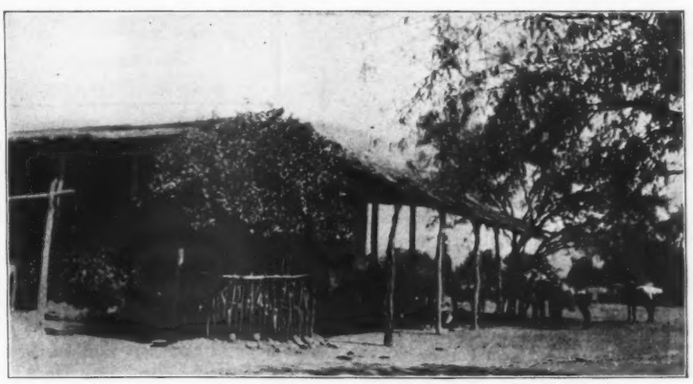


PRIMITIVE TRANSPORT.

While the mining of silver has, from the beginning, taken rank over copper production in this region, I believe that the time is coming when copper interests will predominate over silver interests in the country tributary to Alamos. And while I took occasion to visit the important Minas Nuevas-Quintera-Promontorio silver belt, it is to copper mining that these notes have reference. My travels included a visit to the mine workings of the Piedras Verdes, Reina de Cobre, El Limon-Zapote-Cenizas group, and El Cobre mines.

Piedras Verdes.—This, as the name suggests, is a copper property. It is owned by the Alamos branch of the wealthy and influential Almada family. These mines occupy a ferruginous impregnation-zone of very low-grade ore (certainly less than 2 per cent copper), which is nowhere less than 350 ft. wide, and in many places considerably wider, over a distance of, possibly, three to four miles. Near the surface the copper ores are oxidized; in depth the mass of impregnated country passes into a rock mass in which there is much disseminated pyrite and some chalcopyrite, with narrow seams of native copper and cuprite. The surface excavations attest the work of *gambucinos* in their exploration of the gossan. These workings have resulted in the extraction of a small tonnage of ore sufficiently high in copper contents to admit of exportation. The ore mined here by the so-called *antiguos* was taken out under the domination of the Jesuits (under a system of slavery) and was carried by pack and perhaps by the human animal to *vasos* or adobe smelters situated on the Mayo river about the point where Aguas Calientes is to-day. Extensive slag dumps confirm this information. Handled thus, the crude ores of copper must have at least contained from 15 to 25 per cent copper to have given profitable results.

THE FAITHFUL BURRO, WITH HIS PACK.



GUIRICOBA FARMHOUSE.

To the Jesuits belongs the honor of having fostered learning in this Republic when it was a new land. There is much evidence available to prove that they were versed in some general knowledge of smelting. They knew something of concrete, fire-clays and lutings to reinforce the *adobe.* The first representatives in Mexico of the Society of Jesus (founded by Loyola in 1534) embarked at Cadiz and landed at Vera Cruz in 1572; they were suppressed in 1767 and then alternately re-established and suppressed, until, in 1856, the Jesuits were finally expelled from the country. They have left many a monument, on mine and smelter site, attesting their untiring industry and superior intelligence.

This zone of impregnation above described conforms in strike to the trend (about N. 50° E.) of the volcanic rocks—mainly dacite, dacite-porphyrite and rhyolite. The main productive vein system consists of a series of veins, six in number, running nearly at right angles to the igneous massive rock and possibly occupying contraction cracks in the latter. These veins are termed locally *hilos* or stringers, but this is a misnomer, as they are in themselves the main veins of the property and the only ones discovered that are profitably exploited. In the same way the *Veta blanca,* an intercalated mass of quartzite from 300 ft. to 400 ft. wide, is erroneously referred to as the main vein of the Piedras Verdes group. This *Veta blanca* is a tilted sedimentary and is absolutely barren in respect of copper, gold, silver or any other valuable metal. The producing veins or *hilos* abut against the *Veta blanca* sediments, and end; their strike varies between N. 57° W. and N. 74° W.; some of these veins dip to the southward and some northward, dipping flatly. Veins No. 4, No. 5 and No. 6 vary in width from a few inches to 2.5 ft.; they are distinct and easily recognized in the lower workings. The veins No. 1, No. 2 and No. 3 are small, and little or no work has been done on them.

The general development of the Piedras Verdes consists of a main cross-cut, with connecting workings; the main cross-cut gains something like 75 meters in height of 'backs,'

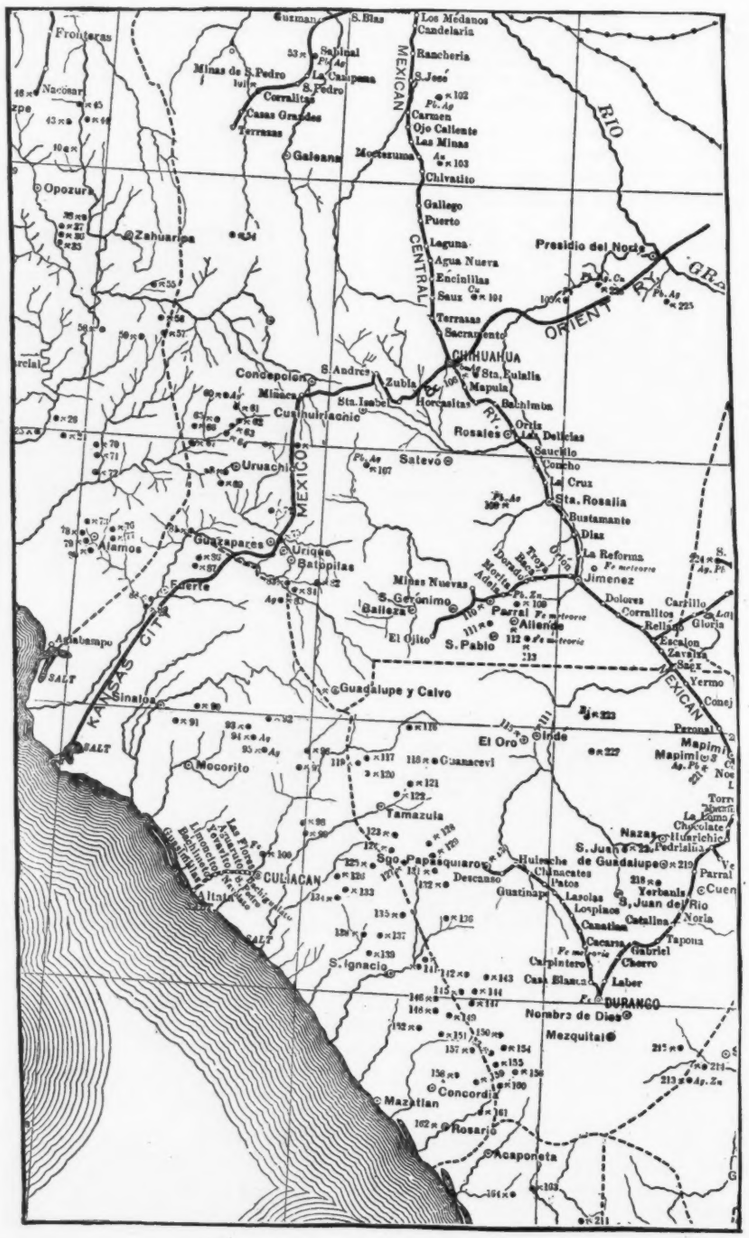
but the upper part of the veins in several instances has been almost completely stoped. There is a main shaft, 68 m. deep, from which levels designated as the fourth and fifth had been advanced 104 m. and 109 m., respectively, at the time of my visit in May of this year. At either end of the property there are other workings, but they explore the impregnated rock mass, and as far as I can learn the deeper developments on this low-grade mass are everywhere unsatisfactory and disappointing. I do not know why it should be otherwise. On the Aglomerado end there is a 60-h. p. steam hoist of good design; workings from this shaft penetrate a granite mass and intersect an immense width of copper-stained porphyry.

The tributors have long ago left the locality, and that is not surprising since they were under contract to deliver ore of 20 per cent copper grade or better; and gained nothing when turning in ore of an inferior grade. For ore of the stipulated copper contents these lessees were paid at the rate of $3, Mexican, per cargo of 300 pounds.

Reina de Cobre.—This mine is situated about 15 miles northwest of Alamos, Sonora. The copper ore occurs in a band of shale that has been much crushed and broken. Within this shale there exists a shear zone, in a brecciated vein-filling, loose and fragmentary, and re-cemented by copper solutions and silica. Some of the ore shows concentric rings of copper minerals, chalcedony, and quartz. The vein strikes N. 58° E., mag., which corresponds with the Piedras Verdes zone of impregnation and to the trend of the volcanic rocks adjacent. In general character it belongs to that class of veins in which leaching at the lower zone of the re-opened vein has brought about conditions favoring the deposition of copper as a cementing material in the upper or surface portion of the same deposit. It is with such brecciation and re-cementation of the vein-filling that copper ore-bodies have frequently been associated. It is also generally recognized that the locus of such deposition is influenced by the existence or non-existence of sulphides (usually pyrite or chalcopyrite) of an earlier deposition. The crushed pyritic mineral always exerts the part of an energetic reducing agent.

The development of the Reina de Cobre, or Copper Queen, consists of surface excavations and underground workings aggregating several hundred feet. There are two shafts on the property, the deeper being a little more than 100 ft. and centrally placed as regards the ore-shoot. The shale country stands nearly vertical. The work done is insufficient to indicate the trend of any existing ore-bodies which are likely to be developed as depth is gained. The open-cuts show patches of copper glance in the mass of carbonate ore, and it is plain that with added depth this mineral-mass is changing into separate veins of copper glance. The width is from 55 to 60 ft. in an ore-shoot approximately 500 ft. long; and in the surface excavations it will average between two and three per cent copper.

The Reina de Cobre lode is covered to the northeast by a conglomerate bed or *caliche* in which granite and dacite-breccia boulders predominate. At the southwest end, the vein cuts off abruptly in the shale. The deeper workings were filled with water and inaccessible, but the work done and the ore on exhibition at surface indicate that there are probably some ore-faces left in the bottom levels. The mining question here resolves itself into that of re-opening an old mine which has been sacrificed to the sorting out of a small proportion of high-grade ore.



MAP SHOWING LINE OF KANSAS CITY, MEXICO & ORIENT RAILROAD.

Taken from large map of Mexico, prepared for the American Institute of Mining Engineers.

REFERENCES TO MINES INDICATED BY NUMBERS ON MAP.

No.	Mine.	No.	Mine.	No.	Mine.	No.	Mine.
60	Pinos Altos.	73	Minas Nuevas.	80	Promontorio.	87	Platanos.
61	Potreros.	74	Chinipas. Batosegachic.	81	Rosario.	88	Sibirijoa.
62	Remedios.			82	Zapuri.	89	Macochin.
63	Jesus Maria.	75	Joven Almaden.	83	Tabares.	104	Placer de Guadalupe.
64	Arechiuvo.	76	Plomosas.	84	Morelos.	105	Hacienda de Chorreras.
68	Batopilillas.	77	Cobre.	85	Encanto.	106	Santa Eulalia.
69	Pinal	79	Quintero.	86	Descanso.	225	Tierra Rica.
						226	Cuchillo Parado.

El Limon-Zapote-Cenizas.—This group takes in sundry scattered prospects which have been worked in a small way for ores of gold and silver, and some copper. The El Limon properties of the Urbe Exploration Company and those of the Sonora & Sinaloa Development Company adjoin. Within their lines there have been developed numerous veins, but as these workings have been generally abandoned it is a fair presumption that the result of this exploration work was unsatisfactory.

Five miles below El Limon, at Zataqui, there has been installed a well-designed gold mill, of 10 stamps, with modern concentrators. This mill has had to treat a great variety of ore, some of it carrying relatively high silver values, much of the latter being wasted. The concentration seems to have been lower than anticipated and the ore supply uncertain. This

mill is now shut down and under care of a watchman.

The Zapote and Cenizas are owned by the Buey brothers and Don Francisco Parra, respectively. They cover a well-defined gold vein which has been extensively worked by the *antiguos,* or at least under the Jesuit rule which prevailed in times gone by. The upper 300 ft. of the vein is owned by the Cenizas people under La Suerte claim, while the deeper extension is included under the Albina denouncement of the Buey brothers.

The Cenizas vein throughout is composed of 2 to 3 ft. of sintery quartz, plentifully iron-stained; the resemblance of the ore to ashes gave origin to the name *cenizas.* The enclosing country has all the appearance of the rock which Mr. W. H. Weed in his geological sketch of the Sierra Madre Occidental of Chihuahua and Sinaloa has referred to as dacite; it is a rock which I have recognized as being of general occurrence in the Sierra Madre over a wide area. The vein of the Cenizas is of the compound-fracture type, it is claimed to average one ounce of gold per ton of ore, but my sampling gave results of 0.5 to 0.6 oz. or, say, $10 to $12 per ton, in a fairly free-milling ore. There is a very limited water supply on the premises, and the arrastras (to the number of four or five) in which the ore was formerly treated are now dismantled.

The separate ownership of the upper and lower portions of the same vein is a condition which must eventually lead to conflict; this is a condition not infrequently encountered in Mexico, while almost unheard of in United States mining experience.

El Cobre.—This mine is distant 35 miles northeast of Alamos. The ore-occurrence is that of a fissure vein in massive andesite, the basement-rock of the Sierra Madre; the copper contents are plainly indicated in croppings of blue and green carbonates in a gossan which stands out boldly from the enclosing rock. This gossany mineral is the invariable accompaniment of copper veins in this as well as in other mining districts of Mexico and across the Sonora border in Arizona and New Mexico. It is here, as elsewhere, the capping of the oxidized portions of veins of copper glance due to secondary concentration, the source of which, in all probability, is a much lower grade copper-bearing pyrite and chalcopyrite.

The workings consist of surface cuts, pits and two shafts, respectively 30 ft. and 75 ft. deep; and an adit from the *arroyo* which gives a vertical height or 'backs' of 130 ft. The developments of El Cobre mine are of the usual irregular character; the production is stated to have been 600 tons of 12 per cent copper ore. The adit is driven on a porphyry dike 2.5 to 3 ft. wide, which is only productive at points where certain copper veins angle into it. No ore of importance has been developed in the lower tunnel, though it has reached a point immediately under one end of the croppings. The ore-body trends flatly away from the direction of the tunnel and in such a way that the tunnel neither proves nor disproves the persistence of the ore-shoot in depth. The extent of it could better be gauged from the upper workings, taken in connection with the surface croppings, etc. It is, in my opinion, not more than 80 ft. long, with a width of 9 to 12 ft. of ore averaging something like 6 per cent, between extremes of 2.6 and 10.1 per cent copper.

THE STILWELL RAILROAD.

By an Occasional Correspondent.

Whether railroads make mining possible or the mining industry makes railroads possible, it cannot be disputed that the benefits accruing to mining enterprises through the creation and expansion of the railroad are very large. These benefits come principally in the simplification of the transportation problem, the reduction of freight rates on ore, on machinery and on mine supplies of every description; the nearer approach of lumber and fuel supply; the betterment of the problem of general handling and innumerable conveniences of little importance in themselves, but signifying much in the aggregate.

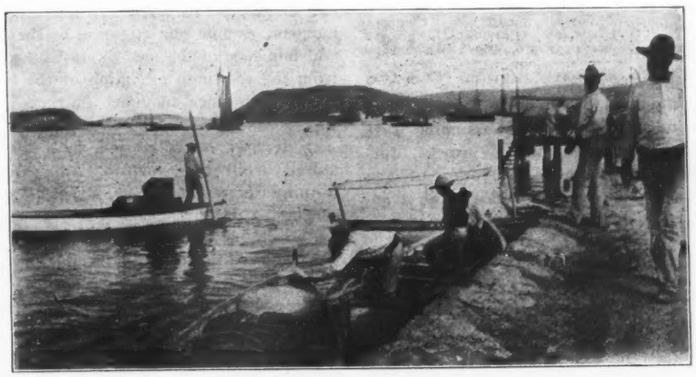
Of modern railroad enterprises to which a rich mining country is tributary—where the mining industry is of paramount importance and ordinary commercial enterprises are incidental—there is no better example than that of the Kansas City, Mexico & Orient Railroad, popularly known as the Stilwell Railroad, which cuts off 500 miles of distance between Kansas City points and the Pacific coast, over any route now existing.

The route takes in Wichita, Kansas, passes through Oklahoma Territory to Sweetwater, Fort Stockton and San Angelo, Texas, crosses the Rio Grande at Presidio del Norte, thence to Chihuahua, and across the Sierra Madre to El Fuerte and Topolobampo on the Gulf of California. I am informed that in adopting a grade of 2.5 per cent instead of the original maximum grade of 2 per cent the survey has been able to greatly simplify the construction work. By this means there has been effected a reduction of difficult curves, and much mountain tunneling has been avoided. Topolobampo bay lies about midway between Guaymas and Mazatlan; it is a deep-water harbor having an area of 70 square miles and almost completely land-locked. The tortuous channel that is followed in crossing the bar in approach to and egress from the bay will be improved upon eventually; the sides of the channel consist of a hard-packed, dredgeable sand, which natural obstruction, once cleared, can be kept open by scouring action of the tide. Topolobampo is advantageously situated as a deep-water port; it is claimed to be superior to almost any other port on the southern Pacific coast line.

TOPOLOBAMPO HARBOR AND TERMINUS OF THE STILWELL RAILROAD.

Though the mining industry is, and always will be, of first importance in the region tributary to this railroad, there are other industries, such as sugar and cereals, which will be benefited by it. There are important coal interests to the northward of the Pacific outlet, in the Santa Clara field, of anthracite and natural coke, which are put within easier reach and some day will be connected by further railroad development. In the Yaqui river country there is a little-known mineral belt, the development of which has been retarded by Indian disturbances. In the advent of a railroad there is guarantee of public tranquillity and protection.

While many railroads are projected in northern Mexico, there are few which, like the Phelps-Dodge lines and the Kansas City, Mexico & Orient, are actually building. The latter is building to bring together the great inter-oceanic and inter-continental lines. It claims to be doing this better than any other route known or projected and on its completion hangs a great deal that is vital to extensive mining interests in northern Mexico, to the States of Chihuahua, Sonora, Sinaloa and Durango.



PORT OF GUAYMAS, FROM THE WHARVES.

Between the city of Chihuahua and the Fuerte valley the Kansas City, Mexico & Orient line

will traverse a country rich in mineral, hitherto accessible with difficulty and much retarded in its development for lack of transportation facilities. Fellow engineers who have been over some of the Sierra Madre trails know what this means. Among the larger mines of the region to be benefited are the mines of Batopilas and Palmarejo, Lluvia de Oro and those about Guerrero. There are also many small mining interests which will be more indirectly served by the advent of a railroad in that part of Mexico. Central and eastern Mexico are devoid of even scant timber for long stretches of *mesa* or plateau, so that timber becomes a valuable asset when it can be brought within reach of such territory. It is certain that some of the finest timber land will be made available, as this railroad passes through a long-leaf pine forest for a distance of something like 150 miles, beginning about 140 miles southwest of Chihuahua.

The total length of the main line when completed will be, according to survey, 1,629 miles. Of this 1,528 miles has been permanently located, and 600 miles is now graded; 200 miles is completed and track laid, not including the Chihuahua & Pacific road of 125 miles which, it is expected, will form part of the through line.

BRITISH IRON ORE SUPPLIES.

The full output of iron ore in Great Britain has now been reported by the mine inspectors. In the following table the production is classified according to the nature of the mines in law; that is, as they fall under the Coal Mines act, the Metalliferous Mines act, the Quarries act, or outside of all. The figures are in long tons:

	1902.	1903.	Changes.
Coal mines act.....	7,214,310	7,473,236	I. 258,926
Metalliferous mines.	1,700,411	1,605,148	D. 95,263
Quarries	3,089,438	3,528,812	I. 439,374
Other workings ..	1,200,114	1,108,449	D. 91,665
Total	13,204,273	13,715,645	I. 511,372

Notwithstanding the increase last year, the output was less than in 1900. The total supplies of iron ore reported were as follows:

	1902.	1903.	Changes.
Ore mined	13,204,273	13,715,645	I. 511,372
Ore imported	6,454,757	6,251,078	D. 203,679
Total	19,659,030	19,966,723	I. 307,693

Taking the total production of pig iron in Great Britain last year and assuming that there was no accumulation of stocks, this would show an average consumption of 2.26 tons of ore per ton of iron made; or an average yield from the ore of 44.1 per cent iron.

LEAD IN SOUTHERN ILLINOIS.—Lead is found and has been mined in Illinois in the extreme southern portion, including portions of Hardin, Pope and Saline counties. The deposits are briefly described by Mr. H. Foster Bain in a recent bulletin (No. 225) published by the United States Geological Survey. In the southern Illinois district the lead found, which has been mined more or less steadily since 1842, is produced at present in connection with the mining of fluorspar. Probably the maximum production of lead was in 1866-67, when there was a yield of 176,387 lb., from the Fairview mine. Within the present year prospecting near Jonesboro, in Union county, west of the fluorspar district, has developed the presence of galena, whether in paying quantities or not it is too early to say.

PYRITE SMELTING. A REVIEW.—VIII.

By Edward D. Peters.

THE BEHAVIOR OF ZINC IN PYRITE SMELTING.

The answers to the question, "What percentage of zinc in the charge can be treated profitably?" are, on the whole, the least perfect and the least unanimous of any of the sets of replies. Of the ten contributors who appear in the large table, six do not answer the question at all, most of them not having had occasion to practise pyrite smelting on ores high in zinc. Our evidence, therefore, is limited to the replies of Messrs. Austin, Bretherton, Lloyd, and Nutting, together with some interesting remarks on the same subject contained in the letters of Messrs. Godshall and Ingalls

Even with this small amount of testimony, there is some conflict of opinion as to the behavior of zinc in the furnace. This disagreement, however, is apparent rather than real, and arises simply from the fact that pyrite smelting covers such a multiplicity of differing conditions, that almost any question may elicit answers totally at variance with each other, and yet, that are not in the least conflicting. In ordinary blast furnace smelting with coke, it may, I suppose, be accepted as a fact that when much zinc-blende is present in the charge, a portion of it is likely to enter the slag mechanically and be carried away still as a sulphide; this tends to make the slag thick and heavy, and to produce losses of values. In the powerfully oxidizing atmosphere of the pyrite furnace, however, it does not seem to me possible that the zinc sulphide can behave in this manner, except in those instances where there is merely a quick melting-down of the charge rather than a genuine pyrite smelting. Blende commences to burn at a dull red heat, and its oxidation, in the presence of an ample air supply, is so free and vigorous, that it is scarcely conceivable that any undecomposed zinc sulphide should be left to be carried into the slag. Consequently, I think that, in that variety of pyrite smelting where a high ratio of concentration is obtained by pushing the process of oxidation to nearly its extreme limit, we can eliminate this point entirely, and, for the moment, confine our attention to the behavior and influence of the zinc oxide that will result from the thorough oxidation of the blende.

This substance may act in three different ways:

1. It may be volatilized, and thus be removed from the smelting zone altogether; forming accretions on the furnace walls, condensing in the dust-chambers, or escaping into the atmosphere.

2. It may be dissolved in the slag as zinc oxide, without combining with silica.

3. It may enter the slag as a silicate, or, perhaps, as an aluminate or ferrate.

The first of these three conditions usually prevails where the percentage of blende in the charge is not excessive (perhaps 6 or 7 per cent), and where the ratio of concentration is high, owing to powerful and prolonged oxidation. This always means a highly silicious or aluminous slag, and a comparatively slow sinking of the charge. The zinc is exposed, before it reaches the smelting zone, to such a high and prolonged oxidizing temperature, that it is completely decomposed and volatilized.

The second and third alternatives may be considered together. These include the cases in which the zinc oxide, in part, enters the slag, but whether in simple solution, or as a zinc silicate, is not, so far as I am aware, definitely settled. At any rate, this is not the place to discuss such a point, and, while the distinction is one of a good deal of importance to the practical metallurgist, we must be content to hold the matter in abeyance for the present, and confine ourselves to studying the effects which zinc oxide produces when it enters the slag, whether it be there in solution, or whether in combination with the silica or other acid constituents.

Austin says that zinc, up to 10 per cent of the charge, is treated successfully, but calls attention to the fact that, in the presence of much alumina, it causes trouble.

Bretherton, who has unusual experience on this particular point, and is, at present, smelting zinky ores with a high ratio of concentration, a silicious slag, a minimum of coke, and a product that has to be free from zinc to escape penalization by the refiners, says: "I do not think it advisable to make a slag containing more than 12 per cent zinc; that is, 15 per cent zinc oxide, and the ferrous oxide must be reduced in proportion. So that for practical running, I would put the maximum amount of zinc oxide at 11 per cent, and the minimum amount of lime at 10 per cent, assuming that there is no magnesia nor alkaline bases in the slag."

Lloyd, referring to reverberatory, rather than pyrite, smelting, says: "My personal experience with zinky slags has been more through reverberatory practice than blast-furnace practice, and I have noted that zinky slag in a reverberatory, that is, a slag exceeding 10 per cent ZnO, while it never becomes as liquid as a slag containing an equivalent amount of silica, but with FeO as practically its only base, still smelts at quite as low a temperature, and, as far as copper is concerned, is quite as clean.' I should say that ZnO has not so much the effect of lowering the fusing point, as of thickening the slag."

Nutting says: "This element, in the form of sulphide, is an unmitigated nuisance. Its bad effects are numerous, and will be noted in the tonnage, recovery, and product; difficulties start with as little as three per cent in the charge, and increase quite in proportion until twelve per cent is reached, when the bad effects become serious."

In the light of Mr. Nutting's reply, we may consider the unfortunate behavior of zinc-blende in that class of cases where considerable heavy sulphides are present, where the slag is not very silicious, and where the ratio of concentration is not high. Under such circumstances we do not have the prolonged and tremendous oxidation at a high temperature that I have referred to in a former paragraph. A certain proportion of the blende escapes oxidation, enters the matte and slag, and produces the disagreeable results so familiar to all of us. I do not at all wish to imply that it would be more advantageous for Mr. Nutting to form a more silicious slag, increase his oxidation and his ratio of concentration, and burn all his blende to oxide before it reaches the smelting zone. I have very little doubt that he is pursuing the method best calculated for paying dividends, and refer merely to the chemical, and not the commercial, features of his difficult ores.

Both Godshall and Ingalls speak strongly on this very point. They claim that if ores contain so much zinc-blende that, in smelting them raw, any considerable portion of the zinc escapes oxidation, and thus enters the

molten products as a sulphide, it may be better to transform the ZnS into ZnO by a preliminary roasting. I quite agree with them on this point, especially where the rate of concentration is to be low and the oxidation moderate; but in cases where there is high concentration, silicious slag, and powerful oxidation, I think that pyrite smelting can be done more cheaply and with less loss of values than roasting and smelting with coke. In a word, I believe that in this class of cases, we can roast the blende more cheaply in the blast furnace than we can outside of it, besides saving enough time and coke to show a considerable advantage for the pyritic method.

Thus far, we have no real conflict of opinion, as any differing expression in the views of correspondents has arisen from the fact that 'pyrite smelting' covers such a wide field, that it embraces conditions under which it can advantageously treat ores high in zinc-blende, as well as conditions under which it would make a poor showing on ores containing a similar proportion of that mineral.

There is one single point, however, on which Mr. Bretherton differs radically both from Mr. Godshall and Mr. Ingalls. Bretherton places the maximum amount of ZnO that the slag may contain at 15 per cent, and says that the FeO should be reduced proportionately, while there should be a minimum amount of 10 per cent of CaO or equivalent earthy bases. He does not mention any reduction in silica; so we may assume that he finds it practicable to run with his normal, rather silicious slag, even when a pretty high percentage of ZnO is present. It must also be explained that Bretherton's slags at Val Verde usually contain 8 to 12 per cent alumina, which he reckons on the acid side.

Godshall says: "High zinc slags invariably require a heavy percentage of iron, and render, therefore, the usually profitable, and always desirable, high silica slags an impossibility."

Ingalls says (quoting from the middle of a sentence): "And the slag must be high in iron . . . in order to carry off zinc."

Hofman, in referring[1] to the slagging of ZnO in the lead blast furnace, says: "Care must be taken that it is not reduced to metal; hence the smelting has to be done quickly, and at a low temperature. This requires a slag not high in silica, and with a preponderance of iron."

My own experience leads me, in certain cases, to concur in the views of the three last named authors. But does not this divergence of opinion between Bretherton on the one side, and Godshall, Hofman, and Ingalls on the other, arise from the fact that the two opposing views are based on opposing conditions?

Only a few months ago, I stood at the tunnel-head of Bretherton's Val Verde furnace, and saw a mixture heavy in zinc-blende and earths, and low in iron, shoveled into the charging door. The slag from this charge was liquid, and, physically, of excellent quality to the eye, and the daily analyses showed that it contained approximately: Silica, 37 per cent; alumina, 10 per cent; ferrous oxide, 25 per cent; lime, 16 per cent; magnesia, 2 per cent; zinc oxide, 7 per cent; copper, 0.3 per cent, with silver 0.5 oz. and gold, 0.02 per ton. A good deal of the zinc in the charge had been volatilized, and the matte contained so little of that metal, that after a single concentration smelting of the matte, the enriched product was free from zinc. Figuring alumina as an acid, the above slag is almost exactly a bisilicate. It seems almost certain, therefore, that in this case, in the presence of a powerful oxidizing atmosphere, a high temperature, and a prolonged contact with free silica, such of the ZnO as escapes volatilization combines with the silica to form a silicate of zinc, and thus acts distinctly as a base, permitting a corresponding lessening of ferrous oxide in the charge, up to a certain limit.

The practical lesson that we may, perhaps, deduce from these observations is, that the proportion of blende that we can successfully handle in a charge, without producing accretions, foul slags, and other well known difficulties, probably bears a definite relation to the vigor of the oxidation in our furnace shaft, always assuming that there must be sufficient free silica to combine with the zinc oxide that escapes volatilization; and, that this free silica must be in excess of the silica that it is necessary to have to form a bisilicate with the lime present, and a singulo-silicate with the ferrous oxide that will result from the iron-bearing sulphides or arsenides that we intend to decompose. This proposition is merely tentative, and for the purpose of inviting discussion.

[1] 'Metallurgy of Lead,' page 292.

MOLYBDENUM IN NEW JERSEY IRON ORES.—The report of the State Geologist of New Jersey says: "Molybdenite is found desseminated through the iron ore from the Hude mine at Stanhope, and is frequently found altered to canary-yellow and orange coatings of molybdite, and possibly ilsemannite. The hornblende, where exposed to the weather, has altered to a golden vermiculite, which might be referred to the vermiculite derived from hornblende and described by Lewis as philadelphite. The Hude ore, like that at Oxford Furnace, is a close-grained magnetite, with massive pyrite through it. The magnetite is often found here with slickensided surfaces, so that it resembles a natural mirror. Such a specimen, weighing about 150 lb., is in the State Museum at Trenton."

UTILIZING WASTE MATERIAL.—Dr. James Douglas, in a recent address, says that a significant example of the recovery of all the valuable constituents of an ore is afforded by the present treatment of that complex mineral, franklinite, by the New Jersey Zinc Company. The mineral consists of iron, zinc and manganese. Every attempt to extract its zinc by the Belgian method was futile, since the iron melted the retorts, but when the Wetherill process of magnetic separation was applied a very pure zinc ore—willemite—was recovered, and the iron and manganese could then be converted into spiegeleisen.

Thus by the co-operation of a modern method—electrical separation—to meet a demand for spiegeleisen, used in the manufacture of bessemer steel, a mineral described by Birkinbine as late as 1899 as "generally included among the iron ores of New Jersey," which was substantially valueless a few years ago, has been rendered the reverse. As an iron ore, it was of little or no value because associated with so much zinc. As a zinc ore it was worthless because of its iron contents; and 10 per cent of manganese added nothing to its attractiveness. Each of these metals was simply a deleterious waste product to the others. Now each adds value to its associate.

HYDRO-ELECTRIC POWER IN MEXICO.

By F. C. Roberts.

The utilization of the energy produced by the waters of the numerous rivers of the Republic of Mexico, for the purpose of generating electric power, has recently attracted a great deal of attention, with the result that several small hydro-electric power plants have been put into operation.

This power is being utilized principally for operating the machinery in connection with textile and other factories, as well as for lighting purposes. The success which has attended these initial efforts has induced a more thorough exploitation of these sources of power, the effect of which has been the recognition of large possibilities in the department of engineering, and at the present time there is one plant being actually installed which it is estimated will develop 18,000 to 20,000 h.p. and another in contemplation which will furnish 43,000 h.p. Both of these are within 150 miles of the city of Mexico. Activity in the same direction is further emphasized by numerous applications recently filed for water rights in several States of the Republic.

The benefits which will accrue to the mining industry through the introduction of a cheap power, for the operation of reduction works, hoisting works and pumps, etc., will no doubt re-animate the mining districts which come within the radius of the power distribution, while the additional possibility of introducing electric furnaces may render of commercial importance a number of mines which, under existing conditions, are considered too low in grade to permit of further exploitation. Equally beneficial effects will be felt in other industries which exist within the radius of economical distribution.

A series of falls occurring in the Necaxa river, in the State of Puebla and distant 115 miles from Mexico city, are at present being equipped with hydro-electric plant, and it is expected that this power will become available for use in about 15 months. The centers of utilization will include the mining district of El Oro, besides one or more districts of lesser importance, within a few leagues of the generating station and the cities of Mexico and Pachuca. It is estimated that the several mining companies in El Oro district will avail themselves of about 5,000 h.p. Of course, the transformation from steam to hydro-electric power will result in a substantial reduction in the cost per ton of ore handled.

Mexico City is at present by far the most important consumer of power in the Republic. The requirements here are about 20,000 h.p., and the increase in consumption during the past three years has been at the rate of 2,000 h.p. per annum, so that with the introduction of a cheaper power a substantial increase upon these figures may be reasonably anticipated.

It is stated that the minimum constant flow of the Necaxa river is 3,500 liters per second, and that the total available head is 400 meters; that is to say, a theoretical constant minimum power of 3,500 by 400 divided by 75, or 18,666 h.p. The contours of the country admit of utilizing other falls, some distance above the present installation, but for the time this power is under consideration. The total length of this transmission will be 115 miles to Mexico city and 160 miles to El Oro.

If, therefore, the following losses are admitted, namely, 0.75 turbines and friction, 0.95 generators, 0.98 transformers elevating tension,

0.88 lines of transport, 0.98 transformers lowering tension, the general return will be as follows: 0.75 multiplied by 0.98 by 0.95 by 0.88 by 0.98, or 0.60. Therefore, upon this showing, there would be a minimum constant power produced of 18,666 multiplied by 0.60, or 11,200 h.p. distributable in the centers of utilization. The consumption of electrical energy is far from being constant; the major portion of power being consumed during the day. It has been noted in many electrical establishments that this maximum is equal to 1.75 multiplied by the average consumption. By a conservation of the waters of the river, during the hours of small demand, a maximum power of 11,200 by 1.75, or 19,600 h.p., will, therefore, become available for distribution during the hours of superior demand.

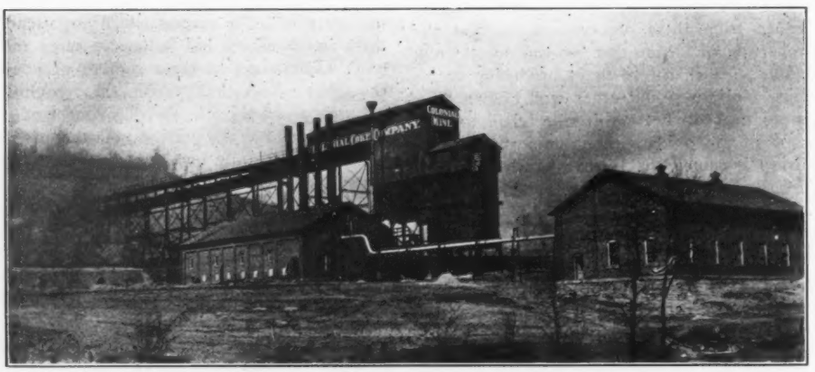
The undertaking forms a striking example of what capital, combined with engineering skill, can accomplish, and the enormous benefits which in consequence will be felt (through the utilization of this as well as other rivers) by the mining, manufacturing and other industries, will only tend to make Mexico more attractive as a field for investment.

GEOLOGICAL SURVEY WORK IN PENNSYLVANIA, MARYLAND AND WEST VIRGINIA.—Under the direction of the United States Geological Survey, Mr. M. R. Campbell will revise the mapping of the Slatington quadrangle, Pennsylvania. In co-operation with the State of Pennsylvania, he will also survey the Amity, Rogersville, Burgettstown and Claysville quadrangles. In this work he will have the assistance of Messrs. W. T. Griswold and F. C. Clapp. The Trenton limestones of eastern Pennsylvania and their continuation into New Jersey will be mapped by Mr. R. S. Bassler. In co-operation with Messrs. N. H. Darton and W. B. Clark, Dr. Florence Bascom will complete the field work and prepare for publication the Philadelphia special folio. Acting in co-operation with the Maryland State Geological Survey, Professor William B. Clark will continue areal and economic surveys in Maryland. Dr. George H. Ashley, assisted by Mr. W. C. Phalen, will make areal and economic surveys of the Nicolas quadrangle, West Virginia. Mr. George W. Stose will complete the areal and economic surveys on the Pawpaw and Hancock quadrangles, in West Virginia and Maryland. He will be assisted by Mr. E. F. Burchard. A revision of the Cadiz-Steubenville quadrangles, in Ohio and West Virginia, will be made by Mr. M. R. Campbell.

THE SMOCK COKING PLANT.

EDITORIAL CORRESPONDENCE.

At Smock, on the Red Stone branch of the Monongahela division of the Pennsylvania Railroad, about four miles east of Brownsville, the Colonial Coke Company, a subsidiary corporation of the Pittsburg Coal & Coke Company, is developing several thousand acres of coal land underlain by the Pittsburg seam. The tract is on the western edge of the present Connellsville coke region, being part of what is known as the lower Connellsville district, an indefinite area, which includes those mines and coke ovens paying the Connellsville rate for labor. The Pittsburg seam produces good coking coal where opened on the Monongahela river near Brownsville and California, but there mine labor gets the Pittsburg rate. The plant at Smock is described here chiefly because it may be taken as a type of a medium-sized plant using the latest practice in making coke in beehive ovens from the Pittsburg coal.



TIPPLE AND ENGINE-HOUSE, COLONIAL MINE.

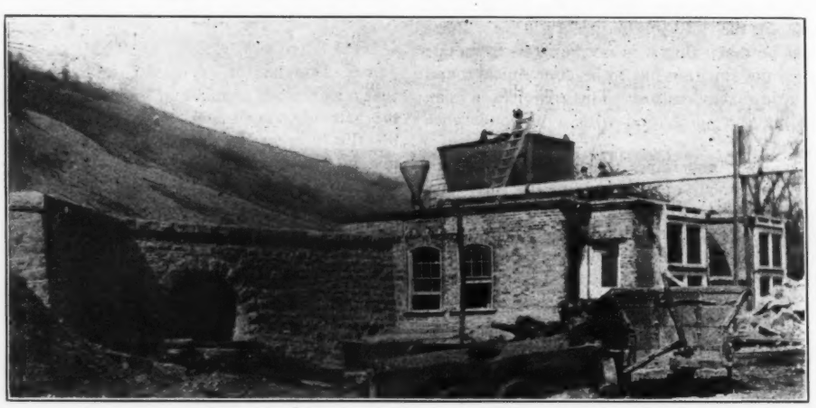
The Colonial Company has completed within 18 months 272 ovens, and now has 402 ovens at Smock, some of these in single bank and some in double bank. The old ovens, 130 in all, were 12 ft. in diameter; the new are 12.5 ft.; both old and new ovens are 7.5 ft. high. The new ovens were built by a Greensburg firm. of Scottdale, the other two by the Connellsville Machine & Car Company of Connellsville.

Miners are paid so much per bushel of 76 lb. The oven men get 10½c. per oven for leveling, and 80c. or 90c. for drawing ovens; chargers, on the motor larries, get $2.10 per day, and forkers, who fork the coke into railroad cars, $1.40 per day. Ordinarily a man can draw two ovens daily; level 20 or charge 65. When the plant is running full capacity 200 ovens are drawn every other day. An oven holds about 9 tons of coal, and the yield of coke is about 65 per cent. Most of the ovens make 72-hour coke.

Water for the ovens and for the power-house is taken from a dam in Lazy hollow, about 1.5 miles distant, and runs by gravity to the plant. The water of Red Stone creek carries too much sulphur to make its use advisable in the plant.

The boiler, engine house and tipple are all substantially built structures. The boiler house, 90 by 46 ft., with concrete foundations, a brick floor, brick walls, and a board roof supported on steel trusses and covered with slate, contains four 150-h. p. tubular boilers, built by the Penn Boiler Works, of Erie, Pa. These are supplied by a 9 by 10-in. Yough feed pump, made by Boyts, Porter & Co., of Connellsville. Mine-run coal and some crushed coal from the charging larries are used for fuel. The boiler-house also contains a Keystone water meter, made by the Pittsburg Meter Company, on the 8-in. main leading to tanks on the hill across Redstone creek.

The engine house, also having concrete foundations, brick floor, brick walls, and a board roof supported on steel trusses and covered with slate, is 70 by 40 ft. It contains a 22 by 42-in. first-motion engine, with piston valves and two 9-ft. drums, built by J. & J. B. Milholland, of Pittsburg, which is used for the main and tail rope haulage system. A Worthington 9 by 8½ by 10-in. pump forces the water for the whole plant to the tanks above mentioned. The boiler-house also contains a McEwen 16 by 16-in. engine, belted to a 100 kw. direct-current General Electric generator for supplying the motor larries. The trolley line is 0000 grooved wire, suspended by wood posts and wrought iron tubes.



MAIN ENTRANCE AND FAN-HOUSE, COLONIAL MINE.

The arch blocks, jams and liners are of fire-brick, plain or shaped. The bottoms are of fire-clay tile, and the crowns have thickness of shaped silica brick, these brick being furnished by the Harbison-Walker, Reese-Hammond and other companies. The walls are of stone. The ovens are charged from double discharge 9-ton larries, having 25-h. p. Westinghouse motors taking current from an overhead trolley. One of the three larries was built by Kenney & Co.,

In the tipple, which is of steel, with board sides and a corrugated iron roof, is an engine-driven Milholland crusher, 18 by 36-in., for reducing mine-run coal. The steel trestle from the tipple-head to the main mine opening has loaded and empty tracks on different grades, and is fenced with posts and bars of iron tubing.

At the mouth of the fan drift is a Capell fan in a fan engine house, having stone walls, concrete floor and concrete roof. This fan is 16 by 7 ft., can either exhaust or blow air, and is driven by an 18 by 24-in. Chambersburg engine.

Convenient to the main mine opening is a blacksmith and repair shop, 60 by 30 ft., with stone foundations, tile walls and a board and slate roof, which contains a 7.5-h. p. electric motor that is to drive the fan for the forge, a grindstone and a drill. Near the blacksmith shop is a small building, of tile, for storing oil.

Much care has been taken with all the steam mains about the plant, not only in the engine and boiler rooms, but also the long 6-in. line to the fan house. Wright separators are used. Elbows are avoided, and the mains are covered with ½ in. of asbestos lagging, then with a layer of tar paper, a layer of duck and lastly with sheet zinc. This makes an expensive but durable job. The fan engine main is suspended by straps and turn-buckles from supports made of old rails set in concrete blocks.

The main opening may take the coal from 2,500 acres of land. The coal lies near surface, and there are two openings with fans, beside the main fan drift; the ultimate intention being to exhaust all air through the large fan, leaving three intake openings. The coal is 8.5 ft. to 9 ft. high. In mining from 1 ft. to 1.5 ft. is left on top and about .5 ft. on the bottom. The top coal is left to keep a thin streak, carrying iron sulphide, and the soft slate, overlying the coal, from getting in to the run-of-mine product, and lowering the grade of the coke. A section in one entry above the coal mined shows 10 in. top coal, 1 ft. slate, 5 in. roof coal, 1 in. bone, 4 in. slate, 1 ft. bone, 2 ft. slate. The coal has a general dip of 6° to the west.

The main mine openings are in a brick retaining-wall, and the slope has brick walls and arch for a distance of 200 ft., it being driven through some old workings left by previous operators. Airways are large, the air drift, which has concrete floor, brick walls and concrete roof for 100 ft., has an area of 100 sq. ft. as far as the first overcast. The room-and-pillar system of mining, the universal method of working the Pittsburg coal, is used. The main face headings are driven double; as are the butt entries. The rooms are driven right and left on the face from the butt headings. The butt headings 480 ft. apart, and the main face headings, 1,200 to 1,500 ft. apart, making panels. Along the main haulage road and the face headings, 100-ft. pillars are left. In the work under way, curves of 60-ft. radius are used on the haulage roads, with the idea of ultimately using electric motors for hauling to the foot of the slope. The highest grades are 10 per cent. The new work is also laid out with 50-ft. pillars between the butt entries, and 60-ft. between the face headings. The rooms are driven 250 ft. long with room-necks 27 ft. deep. The rooms are 14 ft. wide, leaving 16-ft. pillars. The butt entries are 9 ft. wide, and as high as the coal. The mine, when the workings get below water level will be drained by electric pumps.

At present all mining is by pick. The cars are collected by mules and hauled to the slope, where they are made into trips of 30 cars each, the cars holding 33 1-3 or 40 bu. The main rope on the haulage is 1 in. in diameter, and the tail rope ¾ in. When in full operation the tipple will pass 800 to 900 cars in a 9-hour day, but the mine is being opened gradually and no attempt will be made to push production.

THE CARE OF CYANIDE SOLUTIONS.

By W. H. DAVIS.

It has been estimated that 50 per cent of the world's gold production is due, directly or indirectly, to the cyanide process; the indirect production meaning that of mines which cyanidation of the tailings from other processes. No apology therefore is needed by cyanide. No apology therefore is needed for discussing the detailed application of solution schedules and the precautions to be exercised in their handling.

The essential objects in fixing a schedule for any plant are (a) to obtain the greatest possible extraction from the ore, and (b) to effect this with the least possible amount of added cyanide.

As a general rule, an extraction of 93 to 98 per cent will have been effected by the time the offcoming solution has reached the highest point in its titration for cyanide. Furthermore, an ore which consumes but little cyanide will yield a good extraction, and vice versa. It cannot be said that an ore is satisfactorily treated until the offcoming solutions titrate within, say, 0.5 lb. of the storage strength. These statements have been borne out by my experience; in one plant under my superintendence the offcoming solutions often titrated to within 0.1 lb. of the storage strength; the ore treated showing a recovery of 95 per cent of the gold contained.

It is true that some plants are commercially successful where a storage strength of 5 lb. and sump solutions not to exceed 2 lb. are employed; but such practice is abnormal, and only to be defended as economizing time.

The movement of solutions in a schedule is a problem to be solved separately for each mill; a tailings plant will require a different application as compared with a mill treating ore which has been crushed by rolls. In the one case, the ore after loading is wet; and this moisture should be removed in such a manner that the storage solution will not become diluted. In a 'Review of the Cyanide Process for 1902,' by Mr. C. H. Fulton,[1] the schedule in use at the Smuggler-Union cyanide plant at Telluride, Colo., was quoted. The schedule in question was so arranged that no solution was run to waste, the usual effluent waste solution being used to displace the battery water, by which means part of the cyanide consumption was confined to solutions which had become too dilute for active work.

It is a general practice to drain the ore as much as possible by means of a vacuum pump; this, however, tends to pack the pulp, and so retards subsequent leaching. It is not practicable to reduce the moisture below about 15 per cent, and even this is a serious matter when added to the volume of solution, for the latter must in the end remain constant, and therefore this amount must be run to waste, its cyanide contents becoming a direct loss Whatever the quantity, it costs as much per pound as that used in the extraction of the metals.

As previously stated, it was the practice at the Smuggler-Union to displace this moisture with waste solution. Apart from the saving due to satisfying part of the cyanide consumption with what would otherwise have been waste, any increase of the total volume was avoided. The plant was of the double-treatment type; the necessity for extra storage tanks being avoided by a special piping system.

[1]This JOURNAL, January 3, 1903.

In a dry-crushing plant the schedule is simpler, consisting usually of charging into strong solution, macerating for a short time, and then leaching with strong, weak, and wash solutions, in that order. As the ore comes from the bins, its pores, together with the spaces intervening between particles, are filled with air. If it is charged into the tank dry, and the solution applied from the surface of the charge, an ebullition will ensue, which tends to channel the ore. If, on the other hand, the solution is applied from below the filter bottom, the danger of giving too much pressure is introduced, which will produce equally detrimental results. By charging into the solution these drawbacks are avoided, and the ore will retain as much air as the solution will hold; which it will yield up slowly.

The maceration is employed to equalize the charge, and should be followed by leaching. Leaching with strong solution should be continued until the offcoming solution titrates within ½ lb. of the storage strength; whereupon the solution should be allowed to leach below the surface of the charge, and weak solution applied. This in turn should be continued until the offcoming solution is not more than equal to the strength of the weak storage, and then, as with the strong, leaching begins below the surface of the ore, and washing is commenced. In washing I have found particular advantages in the use of what might be termed a third solution. The only objection to this is that it necessitates extra storage and sump, but this will be more than compensated by the protection afforded to the other solutions. With this system the cyanide content of the third or wash solution will tend to become high (from one-half to two-thirds the strength of the weak solution); but as the cyanide it contains is not lost it is preferable to the usual system of washing, in which the solution is run to waste and nothing saved. The wash water, being high in cyanide, will ensure a good precipitation, so that no values will be carried back to the ore; also, being of nearly the same strength as the weak solution, the tendency for diffusion of cyanide into the wash water is minimized, so that the weak (and similarly the strong) solution will not become so dilute, and extraction will continue up to the time when the last solution comes off. The loss of volume, both from evaporation and mechanical imperfections, such as leakage and moisture left in the ore, can be replaced by fresh water.

This method of employing a solution schedule will bring the mechanical losses down to about 0.2 lb. per ton in the northern climates and 0.1 in the warmer. Where the ore is hot from roasting, or even drying, it is not uncommonly moistened with one or other of the mill solutions. While this practice has some advantages in the way of solution concentration—and perhaps even in extraction—by making room for more fresh water wash at the end, it has also some disadvantages in expelling the air from the pores of the ore, and thus impoverishing the air content of the solution. Another phase of the work will require more detail: I refer to the chemical consumption of cyanide in mill solutions, both while in contact with the ore and during the remainder of the cycle. This will be discussed in its relation to alkalinity, upon which the chemical consumption of cyanide in a mill solution mainly depends.

The following method of analysis for alkalinity has been found to give reliable results

in the usual mill solutions; I have employed it for the past year: Prepare a standard solution of sulphuric acid of about N/20 strength, say 3 c. c. to 2 liters of water; mix well, and allow to stand for 24 hours; also a standard solution of c. p. KCN, say 0.5 per cent; mix well and titrate with standard $AgNO_3$ as usual. Now take 10 c. c. of the standard KCN solution, put same into a beaker, add water to 100 c. c. and a few drops of a phenolphthalein solution; and titrate with the acid to a colorless end point, which will give the alkalinity of the KCN in terms of the acid. Note the number of cubic centimeters acid used, and make out table, to 0.1 lb. per ton, for the different strengths of cyanide used in the mill. Now titrate the mill solution in the same manner, first with $AgNO_3$ to get cyanide strength (this to be compared with the table, by which the alkalinity due to the cyanide is known) and then with the acid, to get the actual alkalinity. Then apply the following equation:

$$x = \frac{a \times 100}{b} - 100$$

where a = alkalinity of the mill solution in terms of acid, and b = the alkalinity of the c. p. cyanide, for the same strength of KCN, to be taken from the table. Then x will equal the plus or minus per cent of the alkalinity of the solution, in terms of the cyanide present. If desired the acid can be standardized by a known strength of soda, and the results tabulated in pounds of soda per ton.

It should be noted that the hydrocyanic acid will be indicated as an acid by phenolphthalein, but the same will apply to the standardizing; hence the results will be comparative. HCN gas is soluble in large proportions in water, and not enough will be lost in the time necessary for titration to affect the results. The titration should be made upon a white background, and not in the same beaker that is used for the KCN titration.

When considering cyanide consumption alone, a solution should always have a plus alkalinity, which, however, need not be excessive. Physical chemistry shows that when the salt KCN is added to water it dissociates into ions of K and CN; the water itself dissociates to a slight degree into ions of H and OH. Considering these together, we have K + CN + H + OH = HCN + KOH, which is another way of saying that hydrolysis occurs in cyanide solutions. This reaction goes on until enough KOH is formed, and dissociated to drive back the dissociation of the water. HCN does not dissociate to an appreciable extent in water solutions. It has been proved that when a compound is dissociated in solution, and another compound added, having in common an ion with the first, the dissociation of the first is driven back to the extent expressed in the following equation:

$$Kc = c_1c_2$$

where K equals the dissociation constant, c_1 and c_2 the concentration of the ions (in mols. per liter) and c the concentration of the undissociated portion.[2] If this be true, an alkaline hydrate added to a cyanide solution will drive back this hydrolytic dissociation. It is well to note that this hydrolysis of cyanide solutions increases with the strength of solution.

The double salts of potassium cyanide with base metals are soluble in excess of caustic alkali; they will therefore not be formed to any great extent if protective alkalinity is maintained, excepting with base ores, or ores containing ferrous salts or similar compounds.

It has been pointed out by various writers that atmospheric action, due probably to carbon dioxide, causes consumption of cyanide. Where free caustic alkali is present this would be acted upon first by the CO_2 and the cyanide would be protected so long as the free alkali lasts. These reactions all point to the necessity of a protective alkalinity. When gold dissolves in a cyanide solution and care is taken to remove all carbon dioxide from the necessary air it will be found by titration that the solution is more alkaline than before the addition, in accordance with the usual equation:

$$4KCy + 2Au + O + H_2O = 2KAuCy_2 + 2KOH$$

This equation on the whole is one of oxidation as well as increase in alkalinity. When precipitation occurs the reaction will be one of reduction, for gold is to be recovered in metallic form; and it is also true that the solution will lose in alkalinity (this loss being proportional to the percentage of plus or minus alkalinity). To insure good precipitation, therefore, a protective alkalinity is required; and this, within reasonable limits, will reduce the consumption of zinc as suggested above, by retarding the formation of the double salts.

It can be shown experimentally that gold is as soluble in a solution having a + 25 per cent alkalinity, as in a neutral or even a minus-alkaline solution. This has been demonstrated experimentally by Mr. Hugh F. Watts, of Boulder, Colorado, in recent work. It has been claimed by some cyanide workers that certain ores yield a better extraction with a solution having a minus alkalinity; this might be true for a short time, but in the end contamination of the solution would result, leading to decreased efficacy.

The decomposition of potassium cyanide in a mill solution is a subject but little understood; and this is apparently responsible for a large part of cyanide consumption in practice. It is known that when KCy is oxidized KCyO is first formed, and this breaks up into the carbonates of potassium and ammonium; but this is not all, for in a cyanide solution many organic compounds are found, such as acetates, oxalates, formates, urea, and acids of the benzine series. So long as the compound remains intact its behavior is understood; but when decomposition begins, the effort to trace the reactions leading up to and through the maze of influences and counter-influences due to complex ores, and the conditions of oxidation and reduction, ionization and polymerization, is quite beyond the present resources of chemistry.

Soft carbon steel plates and tubes become permanently contracted when heated and cooled frequently, and it has been found that a 25 per cent nickel-steel tube, when heated to a dull red, showed a greater expansion than the mild carbon steel tube. Further experiments have shown, however, that the alloy containing between 30 and 40 per cent nickel is less susceptible to this expansion. The nickel-steel tube also exerts a greater resistance to corrosion, possesses greater tensile strength, and any elongation due to expansion in service is distributed equally over its entire length, whereas the soft carbon steel generally elongates locally.

[2]Morgan's 'Physical Chemistry,' page 101.

THE IRON AND STEEL INSTITUTE.

A recent circular has been issued from the office of the secretary in London, giving a provisional program of the next meeting of the Institute, which is to be held in the United States. The circular is, in substance, as follows:

It is expected that most of the members will arrive in New York on Friday, Saturday and Sunday, October 21, 22 and 23. The headquarters will be at the Hotel Astor. For the entertainment of the members during their three days' stay in New York, a Reception Committee has been formed including the following gentlemen: Mr. James A. Burden, Chairman; Mr. G. W. Maynard, Vice-Chairman; Mr. Stephen W. Baldwin, Chairman Finance Committee; Mr. L. W. Francis, Chairman Invitation Committee; Mr. C. A. Moore, Chairman Reception Committee; Mr. E. E. Olcott, Chairman Transportation Committee; Mr. Thomas Robins, Jr., Chairman Entertainment Committee; Mr. T. C. Martin, Chairman Banquet Committee, and Dr. R. Moldenke, Secretary.

On October 24 the New York Committee will arrange for optional excursions to powerhouses, bridges, industrial establishments, universities, the Navy Yard, Subway and other places of interest in New York, with boat trips around the harbor and drives in the parks for the ladies of the party, during the morning and afternoon, with the opening of the annual general meeting of the Institute in the evening, followed by a reception.

On October 25 the daylight hours will be devoted to an excursion up the Hudson on a specially chartered boat, stopping at West Point, where the United States Military Academy is situated. On October 26 in the morning and afternoon there will be two meetings of the Institute for the reading and discussion of papers. In the evening the Institute will entertain the Reception Committee at dinner.

On October 27 the party will leave New York in the morning for Philadelphia. The afternoon and the next day will be spent in Philadelphia. On October 29 special trains will leave for Washington, where there will be a reception in the evening by the President of the United States.

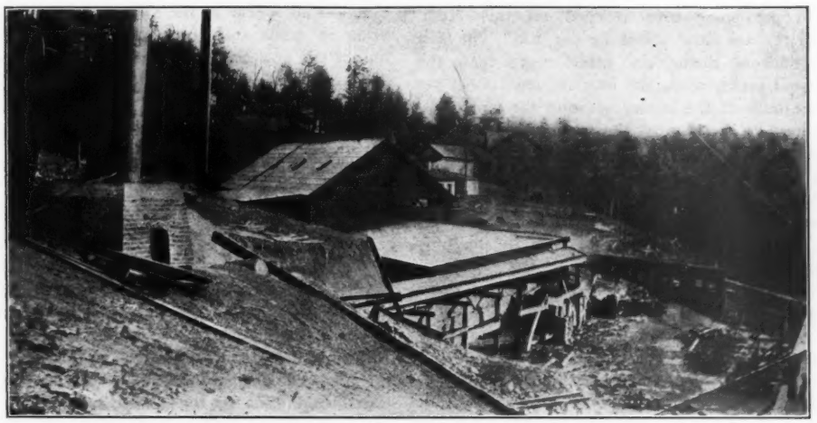
October 30 will be spent in Washington, no special program being arranged. On October 31, in the morning, the party will leave for Pittsburg. The three following days, November 1, 2 and 3, will be spent in Pittsburg. On November 4 the main party will leave in the morning for Cleveland. On the following day the party will leave Cleveland and arrive at Buffalo, spending the night and Sunday there. Those who wish to stop at Schenectady to visit the General Electric Company's plant, can do so, both parties arriving in New York on the evening of November 8, in time for the steamer leaving for England, November 9.

For the convenience of members desirous of visiting the St. Louis Exposition, arrangements will be made for a limited number to leave Pittsburg for St. Louis and Chicago, returning to New York in time for the steamer starting November 12. The special St. Louis party will leave Pittsburg on the evening of November 3, arriving at the Exposition grounds on the morning of November 4, spending Saturday and Sunday in St. Louis, and leaving Monday night for Chicago. The party will leave Chicago on November 8 for Buffalo, spending Wednesday, Thursday and part of Friday there.

THE ARSENIC MINES AT BRINTON, VIRGINIA.

By JOHN L. COWAN.

The production of arsenic in this country is an industry of very recent date. Some three years ago the Puget Sound Reduction Company started a plant at Everett, Washington, which has since been operated. Quite recently an important addition to the arsenic supply has come from the new mines and works at Brinton, in Virginia. The mines were discovered, development work started and a company organized by C. R. Brinton and C. E. Drake, of Pittsburg. The ore is mispickel, or arsenical pyrite, and the deposit is in Floyd and Montgomery counties.



ARSENIC PLANT AT BRINTON MINES.

The mine itself and the village of Brinton, which has been built up around it, are 17½ miles from Christiansburg, on the Norfolk & Western Railroad, and 30 miles from Roanoke. They are nearly at the summit of the Blue Ridge, 3,200 ft. above sea-level, in a rough country, heavily wooded. The original discovery was due to a spring on the side of the mountain, nearly 1,000 ft. below the outcrop of the deposit. The country people had long known that the water from this spring was poisonous, but it was not until an analysis was made that the presence of arsenic was recognized.

The ore is found in a series of fissure veins, outcropping at various places on the surface. At the surface the principal vein is 3 ft. 2 in. in thickness. At a depth of 120 ft. it has widened to fully 14 ft. Twenty veins have been discovered, outcropping on the surface for a distance of seven miles, so that it is believed that the deposits are extensive enough to last for a long period. The ore is unusually rich, and it is claimed that much of it will run from 25 to 35 per cent arsenic.

Prospecting and opening the mine were very difficult, on account of the heavy growths of timber and underbush covering the whole district. It was first necessary to clear these away and make roads over the mountains. A sawmill was then erected in which has been sawn all the lumber used for the mine timbers and for the erection of the plant and dwellings for the miners, more than 600,000 ft. of lumber having been required for these purposes. Brick-works were built, in which have been manufactured over 350,000 brick for the furnaces and ovens. More than 380,000 lb. of machinery was hauled by a traction engine, on a truck especially constructed for the purpose, across two mountain ranges, over nearly 18 miles of very rough mountain roads.

It may be mentioned that the pyrite in the outcrops had previously attracted notice. Several prospectors had explored the region, but no gold being found in their specimens, they paid no further attention to the deposits.

When their value in arsenic was proved, the next step was to work out a method of treatment. As is well known, metallic arsenic has little value, the demand being for its various salts. The most important of these is arsenious oxide, As_2O_3, which is the commercial arsenic, or white arsenic. As few men in this country have had experience in its manufacture, the company secured the services of Mr. W. G. Seldon, who was formerly connected with the mines at Truro, in Cornwall, England, and the plant is under his charge.

The mine is developed by an adit driven into the mountain side for a distance of 217 ft., where it cross-cuts the vein of arsenopyrite, into which entries are then driven in both directions. When the ore is taken from the mine, it is conveyed to a Blake crusher having a capacity of six tons per hour. Leaving the crusher it passes by gravity to the rolls, where it is finely pulverized. Arsenic volatilizes at a temperature of 100° C., and is rapidly vaporized at a dull red heat. Advantage is taken of this fact to manufacture the oxide, in which form it is used for commercial purposes, direct from the ores. In the furnace the metal is volatilized into a gas, and then precipitated as arsenious oxide, which, however, contains many impurities, and must be further purified by sublimation.

The first work at the Brinton mines was performed March 13, 1903; the plant began operation on January 13, 1904, precisely ten months after the first breaking of ground. At the present time the output of the plant is three tons of pure white arsenic every day, or 90 tons a month. All the machinery has double the capacity at which it is now operated, and it is intended to operate up to the full capacity later.

It might be supposed that the men working in the plant would be exposed to unusual hazards. The average duration of life among the workers in the arsenic mines of Europe is said to be less than 40 years. However, the precautions taken at the Brinton mines are so efficient that no poisoning has been observed. From the time the ore enters the crushers until the finished product reaches the casks ready for shipment, it is untouched by human hands. It is carried along from point to point by automatic machinery through each stage of manufacture. Not only this, but the impalpable dust and poisonous vapors generated in the works are so closely confined that the atmosphere of the plant is at all times pure and wholesome. These gases and exhalations are carried off by smokestacks, one 110 ft. and the other 105 ft. high, and thus dissipated in the upper air. As a further precaution, the works are provided with hot and cold baths, which the men are required to use as soon as their daily task is finished.

The town of Brinton, planted on the mountain top as a result of the opening of the arsenic mine, has a population of 162, but this will be augmented as the output of the mines is increased. The company owns 1,020 acres of land, on which are located the mine, nine cottages, besides that of Mr. Brinton, a blacksmith shop, commissary, pump-house, ice-house and other necessary buildings. Nearly $75,000 have been expended on development work. The problem of transportation over the mountain roads to the nearest railroad station at Christiansburg is being solved by the construction of a specially designed motor car, having a carrying capacity of four tons and a speed of seven miles per hour. Arrangements are also being made to light the mines, operate the pumps and run the mine-cars by electricity, the company already own-

BRINTON MINES, PLANT READY FOR INSTALLATION.

ing a complete electric plant. It will therefore be seen that the Brinton arsenic mines are up to date in every particular.

The accompanying illustrations are from photographs, one showing the machinery on the ground before erection, and the other the completed plant.

The mine and reduction works are owned by the United States Arsenic Mines Company of Pittsburg, a corporation capitalized at $500,000, none of which is for sale Its officers are C. R. Brinton, president; John McCloud, vice-president; C. L. Drake, secretary and treasurer. Among the stockholders are Homer J. Lindsay, J. B. Sipe, R. J. Scott, C. A. Brook, James B. Hardie and James Scott. The enterprise was promoted by Brinton & Drake, who have had extensive experience in locating and developing oil, gas, coal and other mineral lands.

THE BRITISH CEMENT TRADE.—The wave of prosperity appears to have turned, the increasing imports and depreciation in exports proving an index of the keen competition with Germany and Belgium. The loss of certain American orders has also influenced the situation adversely. Trade with the British East Indies has improved, but the increase in these shipments equals only about half the decrease shown in the total to all countries. Thus in the five months ending May 31 the total exports were 153,729 tons, as against 170,352 tons in the corresponding period of 1903, a falling off of 16,623 tons, or 9.7 per cent. The shipments to the United States were only 758 tons, as compared with 14,897 tons in 1903, and Canada received only 6,370 tons, against 14,393 tons. British South Africa imported 32,348 tons this year, against 33,938 tons in 1903; the British East Indies, 32,613 tons, against 24,669 tons, and Australia, 18,987 tons, against 17,640 tons in 1903. The balance was sent to various other countries. The British imports during the five months this year amounted to 108,660 tons, which is 4,177 tons more than 1903.

GEOLOGICAL SURVEY WORK IN THE SOUTHERN STATES.—Mr. Arthur Keith will this year complete for the United States Geological Survey areal and economic surveys of the Mount Mitchell, Nantahala, Cowee, Pisgah, Roan mountain, and Morganton quadrangles, in North Carolina, South Carolina, and Tennessee. Assisted by Mr. Hoyt S. Gale, he will make a reconnaissance of the Hickory, Pickens, Walhalla, and Dahlonega quadrangles, North Carolina and Georgia. Dr. W. Lindgren, assisted by Mr. L. C. Graton, will make a preliminary investigation of the mineral resources, particularly gold and tin, in several counties of South Carolina. An areal and economic survey of the Brookwood quadrangle, Alabama, will be made by Mr. Charles Butts, assisted by Mr. Hoyt S. Gale. A revision of the geology of the Cartersville quadrangles will be made by Mr. Laurence La Forge. Preliminary work will be done in the Dahlonega district by Mr. Arthur Keith. Mr. George H. Eldridge will complete field work in the phosphate district of Florida. In cooperation with the division of hydrology, Mr. E. C. Eckel, assisted by Mr. A. F. Crider, will prepare a report on the geology and the water resources of the Mississippi. Professor N. M. Fenneman will make an economic investigation of the oil fields of the Gulf coastal plain of Texas and Louisiana.

SALT MANUFACTURE IN CALIFORNIA.

By CHARLES G. YALE.

The business of salt manufacturing in California is undergoing some important changes. The industry has been in rather a demoralized condition since October, 1902, when the Federal Salt Company was declared an illegal combination by the United States Circuit Court. That company handled and controlled the entire output, practically, and forced prices up as high as $28 per ton, the highest point ever reached on this coast. Prices are now about $3 per ton. The salt producers themselves made more than the usual profit, while the combination lasted, yet the bulk of the money went to the managers. Since its dissolution, the producers have been working independently, though three companies control the plants in Alameda and San Mateo counties, on San Francisco bay. These are the Imperial, the Amalgamated and the California salt companies. Since the dissolution of the Federal Company the operators have not been able to agree, and in fact there is much competition among them.

The salt business dates back nearly fifty years, and it has been increasing in importance as the population on the coast increased. The salt has always been obtained from the waters of the bays opening into the Pacific ocean, being crystalized in vats and reservoirs by solar evaporation entirely. The coast will take from 75,000 to 80,000 tons of salt yearly from local producers, for dairy, packing, fishing and domestic purposes. A considerable quantity is also used by the chemical works. At one time, large quantities were used in the silver mills of Nevada, but that demand has disappeared.

The salt made in California cannot go east into Nevada on account of high railroad rates, but the producers have the markets of California, Oregon, Washington and the various islands of the Pacific, even as far as the Philippines. About 85 per cent of the product comes from Alameda county, near San Francisco. The works are on the eastern shore of San Francisco bay.

The failure of the combination opened the market to the better grades of salt from the eastern States, as it stopped the subsidies which were paid to prevent imports into California. Having finally opened the door to others, the producers now find it difficult to close it. They are therefore changing their systems of manufacture, using more intelligence, and putting in improved milling plants. Formerly, after the salt was evaporated and crystallized, it was ground in a buhr-stone mill and everything that came from the mill went into consumption. Now some companies are putting in rolls to make finer salt, and it is put through the processes of bolting, screening, etc. It is all graded, freed from dirt, and is a much better article than was formerly turned out. This is the most important advance made in the 45 years during which the business has been conducted on this coast.

Considerable salt is being made in San Mateo county, on the same side of the bay as San Francisco. In southern California large quantities are also made. That from Riverside county is taken from the natural evaporation of the waters of the so-called "Salton Sea," the mineral coming to the surface in summer being plowed up into heaps and housed. In Los Angeles and San Diego counties it is made from ocean water. The evaporation is better in that section than around San Francisco bay. As this business depends largely on transportation, the southern California men get better prices, there being a freight rate of $4.50 by water and $5 per ton by rail to San Francisco. But, as there is no agreement, prices are lower than are satisfactory.

At San Pedro, the port of Los Angeles, where there are large salt plants, Mr. E. C. Dolbeer is putting up works to utilize the bittern, or residual waters of the evaporating pans, from which he intends to obtain bromine and magnesia products. He has also caustic soda works at the same place and will bring in crude soda from the desert on the line of the new Salt Lake railroad, which will deliver the soda cheaply. These large deposits of natural soda have never before been utilized. Some caustic soda has been made at the works, but not on a large scale.

SAULT STE. MARIE CANAL TRAFFIC.

The report of Sault Ste. Marie canal traffic up to July 1, this year, shows a very large decrease from last season. This was due to the late opening of navigation and the interruption of business caused by the strike of the masters and pilots. The total freight passing through the Sault canals this year, up to July 1, was: East-bound, 2,269,847 tons; west-bound, 1,319,277 tons; total, 3,589,124 net tons. To the corresponding date in 1903 the total was 11,944,934 tons, showing a decrease this year of 8,355,810 tons, or 69.9 per cent.

The mineral freights included in this tonnage were as follows, in net tons, except salt, which is in barrels:

	1903.	1904.		Changes.
Anthracite	307,863	219,941	D.	87,922
Bituminous	2,368,855	947,946	D.	1,420,909
Total coal	2,676,718	1,167,887	D.	1,508,831
Iron ore	7,439,749	1,385,054	D.	6,054,695
Pig and manuf. iron	43,942	30,762	D.	13,180
Copper	32,564	12,081	D.	20,483
Silver ore	.....	407	I.	407
Building stone	1,690	2,850	I.	1,160
Salt, bbl.	145,287	84,931	D.	60,356

The movement this year must be regarded as, practically, only including two weeks of active work, against nearly two months in 1903. The number of vessel passages this year was 2,689, showing an average load of 1,335 tons per vessel.

DEMAND FOR SULPHUR IN GREAT BRITAIN.—By far the larger part of the demand of sulphur in the chemical manufacturing industry and in the preparation of artificial fertilizers is satisfied by imports of iron and copper pyrite, principally from Spain. In 1903 the sulphur recovered from 735,939 tons pyrite imported, amounted to 345,891 tons, and this compared with 1902 showed an increase of 57,642 tons of sulphur, which, by the way, was equivalent to nearly three times the quantity of brimstone imported from Sicily. The brimstone importation in 1903, which amounted to 20,068 tons, was 3,419 tons less than 1902, and was chiefly refined by the Chance process. In 1904 the consumption of sulphur promises to be smaller than last year. The imports of pyrite in the five months of this year totaled 320,492 tons, containing approximately 150,631 tons of sulphur, which is 2,514 tons of sulphur less than 1903. The receipts of brimstone this year amounted to only 8,001 tons, as against 8,113 tons in 1903. It is interesting to add that the United States imported 390,728 tons sulphur in pyrite and brimstone in 1903, which is 24,769 tons, or 6.8 per cent more than was reported by Great Britain.

A BELT CONVEYOR OF RECENT TYPE.

At this date, it is not necessary to speak of the advantages of the belt conveyors, which are so widely used in handling ores and many other classes of material. The automatic handling of materials of every sort has come to be a necessity in mills of all kinds; in fact, wherever large quantities of material are to be moved from one point to another. The wheelbarrow and dump-wagon are now appropriate only to very small operations.

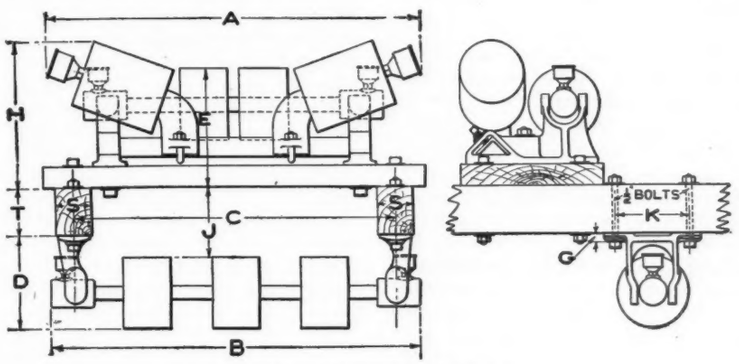


FIG. 1—MOUNTED CARRIER.

The troughed belt has been found specially useful in handling broken, or crushed, ore and similar materials, and its use has extended rapidly. The first conveyors of this type were made with the troughing rollers placed at a sharp angle, as much as 60° in some cases. More recently, the tendency has been to decrease the angle, and at the present time it has been much reduced; in many cases, 20° is now the angle preferred.

The Stephens-Adamson Manufacturing Company, which has compact and well-arranged works at Aurora, Ill., making a specialty of conveyors and of machinery for the transmission of power, has brought long experience to bear on the design and manufacture of belt conveyors. In the accompanying illustration are shown the general construction of two recent types of machinery of this class.

Fig. 1 shows a cross-section and side view of the four-pulley carrier for a conveyor. The engravings show the construction so well that only brief explanation is required. This type of conveyor is made for widths of belt varying from 12 in. up to 42 in. For the smallest size the distance marked *A* in the drawing is 27¾ in.; for the largest, 55 in. The total height of the carriers is the same in both cases. The angle of the troughing rolls is 20°. Fig. 2 shows the carriers for a two-pulley conveyor for smaller work. In this case the width of belt runs from 12 in. up to 18 in. only. For an installation of moderate size this form may often be preferred, owing to its greater simplicity of construction.

Of course, these designs can readily be modified, to suit special conditions. All the conveyors made by this company are provided with a direct pull take-up for adjusting the belt; a device which has proved very satisfactory in operation.

The company claims several points of advantage for its designs, among which may be mentioned the following: The carriers are made with independent troughing and supporting rollers, thus eliminating the wear on conveying belt and permitting great conveying capacity. All bearings are carried outside of the conveying belt and there can be no leakage or dripping of oil or grease on the conveying belt or on the material conveyed. Bearings are made oscillating and self-adjusting, thus conforming automatically to any settling of framework or building. These bearings are also made self-lubricating and dust-proof. The carriers are adapted to handle all classes of material, and there is economy in maintenance resulting from the use of the self-lubricating bearings. Troughing and supporting rollers are made of cast-iron with smooth turned faces, and all appliances are made from the best materials throughout on the most improved machinery and according to the best machine shop practice, of artistic mechanical design with the object of high quality and efficiency in view rather than cheapness in price. The adjustable feature of these carriers is peculiar to their design.

Recent orders placed for conveying machinery, of the type described, include 500 sets of carriers for the Illinois Steel Works, and a complete conveying system for the International Cement Company, at Hull in Canada.

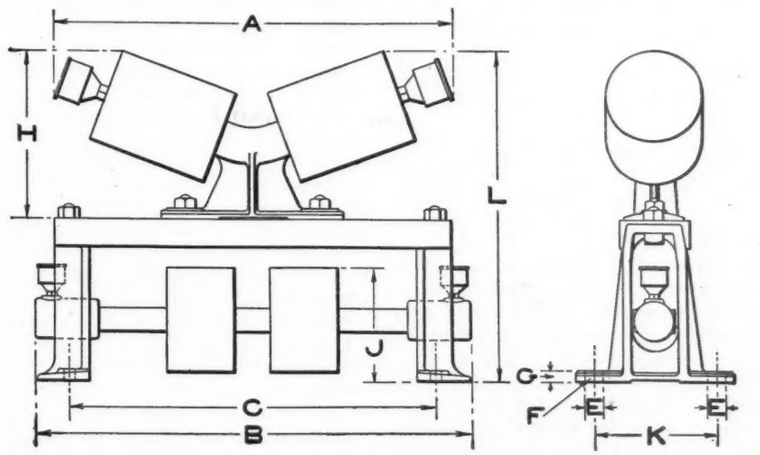


FIG. 2—TWO-PULLEY PEDESTAL CARRIER.

A HAND AIR DRILL.

The accompanying illustration shows a convenient and compact hand-drill, operated by compressed air, which the maker has named the "Little Wonder Air Hammer" drill. It is on the same principle as the air hammers and other pneumatic tools, which are now coming into general use.

The engraving shows very clearly this tool and the method of using it. It is claimed that it will drill holes overhead, back holes or holes in any direction, and that it can be operated anywhere that a man can get. Thus, for instance, it can be used by a man on a ladder, or swung from ropes overhead, if necessary, as it requires no post or tripod. It is also claimed that this drill does not fitcher, and does not get hung up. It is not affected by seams, talc-streaks or similar formations, and at the same time it works readily in homogeneous rock. Worked to its full capacity, it will strike 2,000 blows per minute. The length of the tool over all is 22 in., and its weight is only 17 lb., so that it can very readily be handled. This drill was designed and is manufactured by Martin Hardsocg, of Ottumwa, Iowa.

HAND AIR DRILL.

CADMIUM-SILVER ALLOYS FOR PLATING.—The *Metal Industry* says that the subject of the use of alloys of cadmium and silver as a substitute for silver in electroplating is now receiving more or less attention. Cadmium is white and non-tarnishable, and alloys with silver to form a somewhat hard alloy and possessing a white color. Cadmium itself also possesses a pleasing white color, and although it resembles zinc somewhat in its properties, is more nearly like silver in color. The alloys of silver are easily made by simply melting, and the one which is used consists of 60 per cent of cadmium and 40 per cent of silver.

RECENT LITERATURE ON ECONOMIC GEOLOGY.—XXII. GOLD AND SILVER.

By F. L. RANSOME.

Ore Deposits of the Northern Black Hills. By J. D. Irving. *Bulletin 225*, United States Geological Survey; pp. 123-140, 1904.

The Black Hills constitute an eroded elliptical dome rising above the Great Plains. They comprise a central core of pre-Cambrian crystalline rocks enclosed by successive bands of Cambrian, Silurian, Carboniferous and later beds, dipping away from the crystalline nucleus. The Carboniferous and older rocks are cut by eruptives of various kinds, particularly by rhyolite, syenitic porphyrites, and phonolite.

The ore deposits in the pre-Cambrian schists are mainly of two types, exemplified by the Homestake and Clover Leaf mines. The Homestake type is an indefinite zone of mineralized schist and eruptives differing from the general country rock merely in the greater development of secondary minerals and the more constant and abundant occurrence of sulphides, quartz dolomite, calcite and arsenopyrite. The ore of such deposits consists chiefly of auriferous pyrite and quartz and has no definite walls.

In the Clover Leaf type the ore occurs as a saddle-shaped mass of quartz in contorted schists. The gold occurs chiefly in the quartz, in which it sometimes appears free, associated with a little galena.

The Cambrian rocks contain four types of ore-bodies, viz.: (1) Auriferous conglomerates; (2) refractory silicious ores; (3) pyritic ores; and (4) lead-silver ores. Of these, the refractory silicious ores are most important. They form flat banded masses in two horizons of dolomitic limestone, and their deposition is clearly related to zones of vertical fissuring. The unoxidized ore is extremely hard and brittle, composed chiefly of secondary silica, carrying pyrite, fluorite and occasionally barite, wolframite, stibnite and jarosite.

Although the silver-lead ores of the Carboniferous rocks were once important, they are now little worked.

Ore Deposits of Silver Peak Quadrangle, Nevada. By J. E. Spurr. *Bulletin 225*, United States Geological Survey; pp. 111-117, 1904.

The Silver Peak region, in southwestern Nevada near the California line, has been attracting some outside attention, although none of the five districts embraced within the quadrangle is as yet productive. The chief rocks are Paleozoic limestones, pre-Tertiary granitic rocks and abundant Tertiary sediments and lavas. The ore deposits are all connected with the intrusive granitic rock and occur either within the granite or in the adjacent limestone. The ores are of pre-Tertiary age and are believed to be in part ultra-silicious segregations from the granite and in part deposits found in the limestones by solutions emanating from the granite. The known ores are abundant, but of low grade.

Notes on the Geology of the Goldfield District, Nevada. By J. E. Spurr. *Bulletin 225*, United States Geological Survey; pp. 118-119, 1904

The district lies 23½ miles southeast of Tonopah and 6 miles east of the old camp of Montezuma. The rocks are chiefly silicious eruptives, intrusive into an altered limestone of Cambrian or Silurian age. The lodes consist of cherty quartz, formed by the silicification of rhyolite along zones of fissuring. Recently some good ore has been found.

BOOKS REVIEWED.

Transactions of the American Institute of Mining Engineers. Volume XXXIII. New York; published by the Institute. Pages, 1120; illustrated.

This volume contains the papers and discussions of the year 1902, nearly all of which have already appeared in separate pamphlet form. As in all the Institute volumes, this one contains a number of valuable papers, to which the discussions add much that is of interest and importance.

The South Wales Coal Annual, 1903. Edited and published by Joseph Davies. Cardiff, Wales, 1904. Pages, 235.

This publication gives in concise form a large amount of information regarding the Welsh coal trade, miners' wages, the rules of the South Wales Miners' Federation, growth of the Coal Owners' Association, and the sliding-scale agreements from 1892 to 1902. The bulk of the book is made up of statistics of production of anthracite, bituminous coal, coke and briquettes, prices, ocean freight rates and exports. The book should be of interest to American coal producers looking for foreign markets.

Traité Theorique et Pratique des Moteurs à Gaz et à Petrole. Fourth Edition. By Aimé Witz. Paris, France; E. Bernard. Pages, 1136; illustrated.

The author of this book commenced to write on explosive engines some years ago, and from time to time he has issued new and revised editions made necessary by the rapid progress of this class of mechanical work. The present volume exceeds in size any of its predecessors, and a very considerable part of the material is new. When the first edition was issued, the gas engine was regarded largely as a small motor; the development of the large-sized power units of this kind came later. Another comparatively recent development has been the growth of the automobile business, and the application of gas and gasoline engines to the automobile. This is a subject which has met with especial attention in France, and M. Witz devotes a good deal of space to it.

Rock Phosphates and Other Mineral Fertilizers. Their Origin, Value and Sources of Supply. By Chas. Chewings. Adelaide, South Australia; Government Printer. Pages, 48; with map.

This monograph is a condensed account of the occurrence of deposits of phosphates, nitrates and potash salts. It was written with special reference to the recent reported discoveries of mineral phosphates in South Australia, and intended as a guide, not only to the prospector for such deposits, but also to those who wish to utilize the material already discovered. The author thinks that there is no reason why phosphates, nitrates and potash salts should not exist in Australia, and believes that the work of prospecting for them may reveal new sources of mineral and agricultural wealth. He describes briefly the large known deposits of phosphates, such as those of the United States and Northern Africa, of Christmas Island and others, and refers also to the trade in mineral fertilizers and to the class of rock which it would pay to work. It is a carefully prepared and useful short monograph on the subject.

The Organization of Gold Mining Business. Second Edition. By Nicol Brown. Glasgow: Duncan Campbell & Son. New York: THE ENGINEERING AND MINING JOURNAL. Pages, 220; with blanks and forms. Price, $10.

The first edition of this book, issued some six years ago, was generally well received. Its object was to present a system of organization and accounts adapted to the various exigencies of an extensive mining company, and to show, as clearly as possible, the method in which the accounts should be kept, in order to obtain the clearest and best possible current information and control of the business. This is done by giving forms of books and accounts, with current text explaining the use and necessity of those accounts and their object. In the new edition several new forms have been added, including the accounts required for the treatment of tailings and slime by cyanide and other processes. Some of the text has also been rewritten, with new explanations added, as experience seemed to require. The book should be very useful to mining companies, and to all who have to keep mine accounts.

Architects' and Engineers' Handbook of Re-enforced Concrete Construction. By L. J. Mensch. Chicago, Ill.: *Cement & Engineering News.* Pages, 216; illustrated. Price, $2.

The rapid increase of the use of cement, and especially of re-enforced concrete, in construction, is very remarkable. Great success has been met with in this class of construction, both in this country and abroad, but its extensive use is generally so new that comparatively little has been written about it, and, in fact, information is often difficult to secure. Mr. Mensch has had much experience as designer, consulting engineer and contractor with this class of work, and the questions asked him of clients and others in the course of his work have furnished the keynote for the book, which is intended to be, in the main, an answer to such of the questions mentioned as seemed pertinent. He has treated the subject in plain language, and in a way which would be understood by any layman, as well as by an architect or engineer. Mathematical calculations are generally avoided. Mr. Mensch thinks that re-enforced concrete is the ideal building material of the future, and must in a great measure displace the later materials of construction on its intrinsic merits. This will come when the system is generally better understood, and when experience has shown the stability of construction already erected. We are inclined to think that he is correct in his opinions, and the study of the subject will undoubtedly be of advantage to architects and others.

Traité General de l'Emploi de l'Electricité dans l'Industrie Minière. By N. Lapostolest. Paris, France; Veuve Ch. Dunod. Pages, 296; illustrated. Price (in New York), $2.50.

In this work an attempt is made to sum up the use so far made of electricity in the transmission of power in mines. The author, M. Lapostolest, is chief engineer of the important coal mines of Carmaux, and he had charge of the installation of the electric plant at those mines, which was furnished by the Societé Alsacienne de Constructions Mécaniques. He

has naturally drawn largely upon his experience at those mines, and has shown the methods employed there and summed up the reasons for that practice. After a brief introduction the first part treats generally of sources of power and the production of electricity; the second part describes systems of distribution; the third part is devoted to the motors to which the electricity is transmitted; while the final section gives an outline of the organization and regulations required in an electrically operated mine. M. Lapostolest believes that the triphase current system is particularly adapted to use in the mines, and he sums up the principles governing its use. He has studied carefully the different kinds of mining machinery from an electrical point of view, considering separately ventilators, pumps, hoists and other machines. In the section on power, besides water power and the steam engine, he devotes considerable space to gas engines and to the utilization of waste gases, such as those from coke ovens and blast furnaces. The part on organization and rules shows careful study of methods and deserves a careful reading. While the book is written naturally from a French point of view, there is much in it which will be of interest everywhere.

Moody's Manual of Corporation Securities. Fifth *Annual Volume.* 1904. Edited by John Moody. New York; the Moody Publishing Company. Pages, 2370. Price, in cloth, $10; in flexible leather, $12.

This valuable reference book has now reached its fifth year, and experience has enabled its editor to introduce new features, which add to its excellence. Its scope is shown by the division into eight sections, which include, respectively, the stock exchanges of the United States; American and foreign government securities; steam railroads; electric light and railroad, and water companies; telegraph, telephone and cable companies; industrial and miscellaneous companies; mining and oil companies; banks and other financial institutions. The list of mining companies has been much enlarged since the earlier issues. The large size of the present volume is a sign of the multiplication of corporations and the wide development of corporate activities.

The publisher states that particular effort has this year been made to elaborate those sections devoted to steam railroads and other public service corporations. In the railroad bond descriptions a much wider scope is followed than has been the case heretofore, and the descriptions of mortgages are supplemented to some extent by colored maps. The industrial section is also much more complete than in former issues, and describes many hundred corporations not previously included. Each corporation is fully described as to statistics and property owned and controlled, capitalization and bonded debt, dividends paid, financial condition and earnings, officers, managers and directors, addresses of plants, offices, etc. The statements vary in fullness according to the size and importance of the corporation involved.

Aluminum to be used for electrical purposes must be of the best quality, and as free as possible from intermingled slag or blowholes, which impair greatly its conductivity.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sakes and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of this JOURNAL.

Bulletin of the Cape Town Industrial Exhibition. Cape Town, Cape Colony; the Trades Markets and Exhibitions, Ltd. Pages, 20; illustrated.

Dominion of Canada. Report of the Superintendent of Mines. 1903. Dr. Eugene Haanel, Superintendent. Ottawa, Canada; Government Printing Bureau. Pages, 24.

Proceedings of the Lake Superior Mining Institute. Ninth Annual Meeting. 1903. A. J. Yungbluth, Secretary. Ishpeming, Mich.; published by the Institute. Pages, 152; illustrated.

Dominion of Canada. Report on the Great Landslide at Frank, Alta. By R. G. McConnell and R. W. Brock. Ottawa, Canada; Government Printing Bureau. Pages, 40; illustrated.

Bulletin of the Bradley Geological Field Station of Drury College. Edited by Edward M. Shepard and Harrison Hale. Springfield, Mo.; published by the College. Pages, 44; illustrated.

Labor and Industrial Chronology of the State of Massachusetts. 1903. Part IV. Prepared by the Bureau of Statistics of Labor; Charles F. Pidgin, Chief. Boston; State Printers. Pages, 108.

New South Wales Statistical Register. 1903. *Part III, Land Settlement. Part IV, Population and Vital Statistics.* By T. A. Coghlan, Government Statistician. Sydney, N. S. W.; Government Printer.

An Investigation Regarding the Effect of Kinetic Shocks on Winding Ropes in Vertical Shafts. By J. A. Vaughan. Johannesburg, Transvaal; the South African Association of Engineers. Pages, 32; illustrated.

Les Aciers Speciaux—Aciers au Nickel, Aciers au Manganese, Aciers au Silicium. By Leon Guillet. With *Preface* by H. le Chatelier. Paris, France; Vve. Ch. Dunod. Pages, 100; illustrated. Price (in New York) $3.50.

The Equipment of Laboratories for Advanced Teaching and Research in the Mineral Industry. By Henry C. Jenkins. With Discussion. London, England; the Institution of Mining and Metallurgy. Pages, 172; with plates and illustrations.

DEFINITION OF PORTLAND CEMENT.—The Association of German Portland Cement Manufacturers has adopted the following amended definition of the term portland cement: A hydraulic cementing material with a specific gravity of not less than 3.10 in the calcined condition, and containing not less than 1.7 parts by weight of lime to each one part of silica + alumina + ferric oxide, the material being prepared by intimately grinding the raw ingredients; calcining them to not less than clinkering temperature and then reducing to proper fineness.

The average composition of numerous brands of German portland cement during 1902 and 1903 was: Silica, 22.50; alumina, 7.39; oxide of iron 3.00; lime, 63.14; magnesia, 1.65; sulphuric acid, 1.66 per cent.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

A Correction—Parral.

Sir.—I have noticed in your issue of June 9 a statement from 'Parral correspondents,' part of which I wish to flatly contradict.

It is the part which pertains to the mines being worked by Mr. G. G. Gillett. One of the properties known as the Quebradillas, recently acquired by him, was worked by parties of this city for the last four years on a lease, shipping about 80 tons per day, the leasers paying a gross royalty of 75 per cent. In all my experience I have never known of such a royalty extending over such a long period.

I have no personal interest in Mr. Gillett or the Pan-American Mining Company, but I would like to see your informants tie themselves down to facts.

FRANK FLETCHER.

Parral, Mexico, June 24, 1904.

[Since the receipt of the above letter, we have written to two reliable engineers at Parral and their letters sustain Mr. Fletcher in his protest. The original information on which our comment of June 9 was based came from a source hitherto trustworthy.—EDITOR.]

Sir.—In your issue of June 9 reference was made to the connection of Mr. G. G. Gillett with the Pan-American Mining & Smelting Company, but the allegations of your correspondents at Parral, whoever they may be, are so widely at variance with the facts that I venture to make the following statements, knowing that the ENGINEERING AND MINING JOURNAL stands on so high a plane that it would not knowingly do an injustice to any man.

In the first place it is a well-known fact that Mr. Gillett is not now, nor has he for some time been, connected either with Dr. Flower or with the Pan-American Mining & Smelting Company. Next, Mr. Gillett's deportment and dealings in Parral have been in every sense of the word manly and honorable, and he has expended more money in legitimate mining in the Parral district during the last year than any two concerns excepting the Montezuma Lead Company and Pedro Alvarado.

Finally, the two unimportant properties of "little value" which Mr. Gillett is working consist of the Grenadina mine in Santa Barbara and the Quebradillas on the Veta Colorado, the latter being the largest single producer of silicious ores in the district; 1,500 tons per month now being shipped, and notwithstanding extensive improvements, this property is making money. The Grenadina's output is increasing rapidly, and it is making expenses.

G. A. BURR.

Laredo, Texas, July 6, 1904.

ASBESTOS SHEETS.—Asbestos cement sheets for lining walls and ceilings, and asbestos slates for roofing, are comparatively new products, fireproof, and unaffected by obnoxious gases or acid fumes.

ABSTRACTS OF OFFICIAL REPORTS.

United Gold Mines Company.

This company is a consolidation of several mining companies in the Cripple Creek district in Colorado. Its report covers a period of about two years, from the date of organization to May 31, 1904.

The financial statement gives the assets, liabilities, earnings and expenses all together. Separating these carefully, we find the general statement of assets and liabilities as follows:

Capital stock	$5,000,000
Bills payable	37,135
Total liabilities	$5,037,135
Treasury stock	$40,034
Unissued stock	990,931
Property owned	3,517,985
Investments	268,580
Profit and loss, balance	86,447
Bills receivable	127,740
Cash	5,418
Total assets	$5,037,135

The statement of receipts and payments, found in the same way, may be summed up as follows:

Ore receipts	$1,261,039
Miscellaneous	12,291
Total receipts	$1,273,330
Mining and general expenses	$329,434
Treatment, freight and sampling	329,731
Paid lessees	355,089
Paid Jerry Johnson Mining Co.	28,394
Total expenses	$1,042,648
Net receipts	$230,682
Dividend account	317,129
Balance to profit and loss	$86,447

The report gives statements from the general manager and consulting engineer, showing the conditions of the various properties in detail; also maps and views illustrating their situation and relation to each other. The properties owned by the company are operated, for the most part, by lessees.

President Warren Woods' report says: "In May, 1902, the company acquired, through the issuance of 3,994,769 shares of its capital stock, the mines and property of the following named companies operating in the Cripple Creek district: Consolidated Mines Company; New Zealand Consolidated Mining Company; Damon Gold Mining Company; Columbine-Victor Deep Mining & Tunnel Company; Battle Mountain Consolidated Gold Mining Company; Columbine Gold Mining Company; Bonanza Queen Gold Mining Company, and United Mines Transportation Company.

"From the above companies there passed to the United Gold Mines Company all of about 181 acres, and part or control of 194, or a total of 375 acres, which, in the past two years, have, as given below, increased to 400.384 acres, comprising the following groups: Wild Horse, 59.577 acres; Damon, 26.362; W. P. H., 35.429; Deadwod, 34.200; Pinnacle, 37.691; Bull Hill & Straub Mountain, 16.613; Requa, 27.261; M. K. & T., 54.217; Panther, 30.672; May Belle, 37,971; Conejos, 40,391; totals 400.384 acres.

"The Londonderry suit, involving apex rights, the most important case against the United Gold Mines Company, having been decided in favor of the company May 23, 1904, there remains no litigation which it is believed will affect a material or productive part of the property. An action has been brought against the company, arising out of an old contract entered into by the Battle Mountain Consolidated, one of your company's predecessors, which is not regarded as having any substantial basis. Less than 18 acres remain unpatented, the major portion of the same consisting of minor fractions whose conflicts cover only a small part of that amount, and all of the mining adverses against the unpatented claims which have thus far been heard have been won by the company.

"A strike was called for the miners of the Cripple Creek district, August 10, 1903, and, since the company had been for months endeavoring to overcome the obnoxious gas from the eleventh level of the Gleason shaft, it was determined to suspend work until the strike was broken and the gas should cease, or some means be found to combat the same.

"The energies of the company were then directed to the development of other of its holdings, principally through lessees. At this date the entire district is working, either upon a non-union or open-shop basis, and, the gas having lessened, it should permit a resumption in the near future. Work upon company account will be started shortly on the Wild Horse, Damon and W. P. H. groups, with every prospect of a tonnage which will repay a large profit.

"The number of mineral blocks operated by lessees is 26, the average number of men employed being 130. Through the work of lessees the important ore-bodies of the W. P. H., Silver Tip, South Wild Horse and several other mineral occurrences of value have been discovered during the past six months. In nearly every instance, the company limits all leases as to depth, reserving adjoining or alternate blocks for its own operations, and the rate of royalty obtained brings in a large revenue without outlay. The United Gold Mines Company is one of the pioneers of the leasing plan, and one of the first to recognize the utility of the cyanide process as adapted to the oxidized ores of the district. The leasing policy for such territory as will not be immediately worked by the company will be continued and should from time to time uncover many new veins and ore-shoots.

"The company's several mines are amply provided with all necessary machinery for hoisting, tunnel driving and general development, requiring at the present time no additional investment. Since September last, after the losses incurred by the strike and the Gleason shaft operations, the balance each month is found upon the right side and the improved condition of finances is reflected in the treasurer's report. The conduct of the Londonderry and other cases to successful issues has entailed a large expenditure and the care and protection of such an estate, together with the safeguarding of the corporations controlled by the company, has required considerable sums from time to time which will, for the ensuing year, be greatly reduced."

The report says further: "The United Gold Mines Company is the owner of all of the issued stock of the United Mines Transportation Company, which is chartered under Colorado laws as a common carrier, its purpose being to convey by electric trolley system, both underground and upon the surface, the ores and waste of the various mines of the United Gold Mines Company, also affording other corporations owning property upon the line of the company's tunnels transportation facilities. In addition, it will prospect at depth the undeveloped territory of the company and afford an outlet for water which may be raised from deeper levels. The company has been in active and successful operation for three years, and has proven conclusively that a very large saving over steam railway rates can be effected in transportation by this modern method of moving ore from the mine to the mill. For some time past, the business of the Transportation Company has been confined to handling the tonnage of the Gold Coin mine and lessees operating through May B. and Gold Coin laterals, but it is anticipated that large additional revenues will be had as the Bull Hill lateral is continued through west Battle Mountain into Bull Hill.

"Portions of the system now in operation are: The main tunnel from its entrance at the Economic Mill to the Gold Coin shaft, of which 1,090 ft. is 9 by 14 ft. in size and equipped with double track, the remainder being single-tracked except at switching points, 3,808 ft.; the Bull Hill lateral, 7 by 9 ft. in size, 2,000 ft.; the May B. lateral, 723 ft.; the Gold Coin laterals, 330 ft.; sidings, 901 ft.; Economic mill trackage, 405 ft.; dump ground trackage, 1,295 ft.; total trackage, 9,462 ft. The tunnel, as projected, will enter the southerly limit of the Requa group 557 ft. from its present breast, and thereafter will traverse territory under the control of the United Gold Mines Company for a distance of 3,080 ft. to the northerly end of the Trail claim. Thence it will extend 4,075 ft. northerly to a point upon the Wild Horse vein immediately opposite the Gleason shaft. Of this distance, 1,356 ft. is through property now controlled by the United Gold Mines Company. If carried from that point northerly to a connection with the Damon shaft, this extension will be almost entirely within the lines of the company. At a point 1,480 ft. north of the north end line of the Trail lode, the Deadwood lateral will branch to the northeast, the distance to the Deadwood shaft being 3,025 ft., the last 1,060 ft. being within the Deadwood group. Between the north end of the Trail and the southerly boundary of the properties owned or controlled by the United Gold Mines Company, in the Wild Horse and Bull Hill & Straub Mountain groups and between the main line of the tunnel and the Deadwood group, the tunnel traverses, or passes sufficiently near, to afford means of transportation to some of the richest mines lying on the south and west slopes of Bull Hill. It will be noted that the territory of the United Gold Mines Company will receive thousands of feet of development through the main tunnel and its transportation laterals and that all new veins encountered can be very economically worked therefrom.

"The tunnels and laterals now completed are almost entirely in granite and the system is laid with 35-lb. rail. The run from the Gold Coin mine with trains of 25 cars of ore or waste to the west terminal at the Economic mill requires less than 5 minutes, and a saving is effected to the Gold Coin above the former method of shipping of 65c. per ton. When completed there will be four miles of underground trolley system in operation, nearly $250,000 having been expended in tunnel construction and equipment up to the present time. The United Mines Transportation Company owns 94 tunnel cars, a Morgan electric locomotive and a tunnel house, containing office, blacksmith and machine shop, warerooms, etc. The system is electrically lighted and is driven by electricity from the Pike's Peak power plant of the Pueblo & Suburban Traction & Lighting Company."

Calcined flints are now used as packing for Glover or Gay-Lussac sulphuric acid towers, or in condensers for other chemical gases.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Hard, or Antimonial, Lead.—I have a product that carries from 20 to 40 per cent antimony, and from 65 to 45 per cent lead; that is, the ore has about 85 per cent of combined antimony and lead. So far we have been unable to separate the metals by a gravity process. Can you tell me if there is any smelter in the United States which handles such material?—J. E.

Answer.—The separation by gravity, of which you speak, has never been effected, so far as we are aware. However, there should be no difficulty about getting such material smelted, or disposing of it to smelters. The American Smelting & Refining Company makes more or less hard, or antimonial, lead at several of its plants, principally from Mexican and Canadian material. The Selby Smelting & Lead Company, in San Francisco, and the Balbach Smelting & Refining Company, of Newark, N. J., also handle this kind of material.

We may add that it is a by-word in the metal trade that there is always an extra demand for antimonial lead in the year of a Presidential election, owing to the quantity of type material required in that year.

ZINC AND LEAD DEPOSITS OF NORTHERN ARKANSAS.

A lead and zinc producing region of increasing economic importance is described in 'Professional Paper No. 24,' recently published by the United States Geological Survey for gratuitous distribution. The author of the paper is Dr. George I. Adams, who was assisted by Prof. A. H. Purdue, of the University of Arkansas, and Mr. Ernest F. Burchard. This report covers Marion county and parts of Searcy, Boone and Newton counties. The stage of development of the field is such that the report is a preliminary one, as few of the ore-bodies have been worked sufficiently to determine their extent. There are many openings and prospects, but few producing mines. Besides describing these mines and prospects, Dr. Adams discusses in detail the geological occurrence and origin of the various deposits.

The principal ores of this district are zinc sulphide, or sphalerite, and lead sulphide, or galena. The zinc sulphide is commonly called blende or 'jack.' Specimens of this ore from northern Arkansas average close to 66 per cent of metal, but the ore as marketed is not always so pure, for when it is cleaned it is impossible to completely separate from it all other mineral matter. Lead sulphide occurs in well-defined crystals showing cubic form or as crystal aggregates. The northern Arkansas product contains practically no silver.

The completion of railroads already projected will afford facilities for shipping this Arkansas ore, so that mines which could not be operated will probably begin work. Although few of the mines are situated near the railroads, the distances which the product must be hauled will be so lessened that the ores can be marketed profitably.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DAMAGES FOR ILLEGALLY TAKING OIL FROM LAND.—The measure of damages for one unlawfully taking oil from the land of another is the difference between what it sells for in the market and the cost of production.—Crawford v. Forest Oil Company. (57 *Atlantic Reporter*, 47); Court of Common Pleas of Pennsylvania.

CITIZENSHIP OF PARTIES NOT A QUESTION FOR STATE COURTS.—In an action to quiet title to a mining claim, in which no issue of the right to purchase other claims from the government of the United States was raised, a decree that one of the parties is entitled to purchase other claims from the government is erroneous, as not within the issues. In such an action, in a State court, the fact as to whether a party is or is not a citizen of the United States is immaterial. A find that the plaintiff is not, and that the defendant is, the owner and entitled to the possession of the property in question is sufficient to support a judgment.—Gruwell v. Rocco (74 *Pacific Reporter*, 1028); Supreme Court of California.

THE DAVIS-COLBY ORE-ROASTER PATENT.—In Philadelphia, July 5, the United States Circuit Court of Appeals gave its decision in the appeal from the Circuit Court decision, involving the validity of the Davis-Colby patents. The decision is, in substance, as follows:

The Davis-Colby Ore Roaster Company is the owner of a patent process for roasting and calcining iron and other ores by use of gaseous fuel, which process has been for some years in successful use in desulphurizing iron ores, or in roasting magnetic ores for rendering them porous, or in treating wet hematites for elimination of moisture and chemically combined water. As long ago as 1890-1891 several kilns adapted to this process were erected at the Colebrook furnaces at Lebanon, Pa. In 1894-1895, some important improvements in the process having been made, a proposal was presented by the Davis-Colby Company to the Lackawanna Iron & Steel Company, which had in the meantime become owner of the Colebrook plant, for the erection and operation of a trial kiln at Lebanon. This kiln was built and put in operation in 1895. When the trial run had been concluded an offer was made by the Davis-Colby Company for the construction of a battery of kilns at Scranton for the Lackawanna Company. This offer was declined by the Lackawanna Company, which proceeded, under the direction of its manager, Henry Wehrum, to erect from its own designs a roasting kiln of capacity of 600 tons daily, at an admitted cost of over $100,000. This kiln was successfully and continuously operated until 1900, when it was taken down and the structural material utilized for the installation of a similar kiln at the Colebrook furnaces at Lebanon. The Davis-Colby Company claimed that these two kilns embodied the essential features of its process, and in 1900 brought suit in the United States Circuit Court of the middle district of Pennsylvania, at Pittsburg. The case was vigorously contested on both sides, with the aid of varied exhibits and models, and developed a very interesting mass of technical and expert testimony on the various phases of the operations of roasting and calcining ores.

While the case was pending very large rectangular kilns of the same general character were installed at the Lebanon furnaces of G. Dawson Coleman and at the works of Joseph Wharton, at Port Oram, N. J. Both these structures were erected by Frank Roberts & Co., of Philadelphia, under their own plans, but licensed by the Davis-Colby Company. Several similar kilns have recently been constructed in England by Roberts & Co. under the name of "Roberts kilns."

A decision in favor of the Davis-Colby Company was handed down in the Circuit Court in February, 1904, by Judge W. H. Archibald. An appeal was taken from the Circuit Court to the United States Court of Appeals, which was argued before the three judges at Philadelphia in March last, and on July 5 a decision was handed down sustaining the decree of the lower court. An injunction has been issued restraining the defendant from use of the kiln at Lebanon, or elsewhere, and a master has been appointed by the court to assess damages.—Davis-Colby Ore Roaster Company v. Lackawanna Iron & Steel Company (Reported by New York *Iron Age*); United States Circuit Court of Appeals.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending July 12, 1904.

764,542 and 764,543. PORTABLE APPARATUS FOR SHARPENING THE GRINDING-DISKS OF ATTRITION-MILLS.—Edward P. Alsted, Truesdell, Wis. In apparatus for sharpening the grinding-disk of an attrition-mill, an attachable supporting means, an abrading-wheel mounted revolubly and shiftable endwise on said supporting means, a gear-wheel concentric with said abrading-wheel and independent of the movement endwise of said abrading-wheel.

764,557. CONCRETE-MIXER. — Henry Campbell, Chicago, Ill., assignor of one-half to Edward O. Marsh, Jackson, Mich. In a concrete-mixer, the combination of a rotating drum and a plurality of sets of buckets along said drum for introducing material thereinto, there being a plurality of buckets in each of said sets, and the buckets of each set being arranged at different points on the circumference of said drum.

764,568. DUMP-CAR.—Alfred Ellis, Passaic, N. J. In a dump-car, a truck, a car-body pivotally supported thereby, a side-board having arms at its opposite ends connected to the car-body, links having each one end supported by a stationary pivot and its other end loosely connected with the corresponding arm, and rigid supporting arms or braces carried by said links adapted to contact with the truck.

764,592. SYSTEM FOR THE CONTROL OF ELECTRIC FURNACES.—Woolsey M. Johnson, Laharpe, Kan. A system for the control of electric furnaces, comprising a pyrometer, an indicating device connected therewith, a regulating device for the furnace-circuit, and means connected with said indicating device for operating said regulating device.

764,595. METHOD OF CONVERTING THE ENERGY OF FUEL INTO ELECTRICAL ENERGY.—Hugo Jone, Chicago, Ill. A method of generating electrical energy which consists in first combining a metal, the oxide of which yields chiefly carbon dioxide in addition to the metal in its reduction by carbon, as the positive plate with an alkali as the electrolyte in a galvanic cell, generating electrical

energy by oxidation of the metal, and then reducing that battery product which contains the metal oxidized in the battery reaction, to the metal by means of the oxidation energy of fuel, and repeating the oxidation of the metal with generation of electrical energy.

764,600. STEAM-SHOVEL.—George W. King, Ohio, assignor to the Marion Steam Shovel Company, Marion, Ohio. The combination, with a dipper, and a hoisting-drum and intermediate guiding-sheaves, of a double cable connecting said drum and dipper.

764,601. APPARATUS FOR PRODUCING COMBUSTIBLE GAS FROM PETROLEUM-OIL OR OTHER HYDROCARBON FLUIDS.—Charles A. Kuenzel, Brooklyn, N. Y. A combustion-chamber, a steam-chamber, a hydrocarbon-chamber exterior of said combustion-chamber and adjacent said steam-chamber and adapted to receive heat from said steam-chamber, means for heating a supply of air, means for commingling said heated air with the hydrocarbon heated in said chamber and a flue passing through said steam-chamber adapted to convey such heated fluids toward the point of combustion.

764,621. ARTIFICIAL-STONE-MAKING-MACHINE.—John B. Oliver, Oklahoma, Okla. The combination of a sustaining and supporting frame, with a mold-car mounted and movable on a track, and a delivery-car mounted on a track and moving at right angles to the mold car, and having a carrying plate or plates forming the bottom of the mold-car during the process of forming the stone.

764,623. MACHINE FOR MOLDING ARTIFICIAL STONE.—Noyes F. Palmer, New York, N. Y. The combination of a mold having a perforated base-plate, with a tapering open shell mounted thereon, a vertically-movable core-plate, and a closed tapering core mounted upon said plate, and adapted to be projected through the perforated base-plate into said shell.

764,664. HYDRAULIC WELL-DRILL.—John O. Jones, Hyannis, Neb., assignor of one-half to A. J. Palmer, Hyannis, Neb. A drill comprising a tube, a drill-bit connected thereto, said drill-bit having a central opening, and a slot extending from the said central opening to the upper end of the bit.

764,669. SEPARATOR-GRATE.—Nicholas F. Metz, Ashton, S. D. A separator-grate comprising a plurality of members extending substantially longitudinally of the machine and diverging from the point of their supports, in combination with means for adjusting said members to carry the space between them.

764,700. MINER'S LAMP.—George Anton, Monongahela, Pa. A lamp for burning tallow, wax or the like, comprising an outer shell of metal having a relatively low coefficient of heat conductivity, and an inner shell of metal having a relatively high coefficient of heat conductivity, each of said shells comprising a body, a bottom and a wick tube or spout, the bottom of the outer shell having a flange and a raised portion, forming an annular groove or recess receiving the lower edges of the body portions of the shells, and the bottom of the inner shell having a depressed portion seated on said raised portion of the bottom of the outer shell, and a flange projecting into said groove or recess and crowding the said lower edges of the body portions of the shells outwardly toward and against the said flange of the bottom of the outer shell.

764,706. AIR OR GAS COMPRESSOR.—John Braunwalder, Chicago, Ill. An air-chamber provided with a piston, and valves for controlling the admission and ejection of air therefrom, in combination with a cylinder provided with a reciprocating piston and a toggle-lever connected at one end to the air-piston, at its opposite end to a fixed point, and having its knuckle connected to the reciprocating piston.

764,709. RESPIRATORY APPARATUS FOR FIREMEN OR OTHERS.—Charles E. Chapin and Arthur A. Sherman, Berkeley, Cal. A respiratory apparatus having a plurality of reservoirs, and means to successively discharge the contents of the reservoirs.

764,715. CYLINDER FOR BALL-MILLS.—Gaston Descamps, Mons, Belgium. A cylinder for ball-mills provided with rows of lining-stones having bulged heads and intermediate opposing rows of lining-stones arranged in pairs and having straight beveled faces, to form V-shaped valleys.

764,769. PACKER FOR DEEP WELLS.—Lawrence E. Robinson and Peter E. Daubenspeck, Butler, Pa. The combination of a tube, an expansible packer carried thereby, a resistance device movable with relation to the tube and adapted to afford resistance to the packer, a holding device adapted to prevent the operation of said resistance device, and a releasing member having only a vertical operative movement and thereby adapted to release said holding device without any lateral or turning movement of the parts.

764,810. METHOD OF TREATING PIECES OF MICA OR OTHER MATERIAL TO PREPARE THEM FOR ADHESIVE UNION WITH EACH OTHER OR WITH OTHER ARTICLES.—Charles W. Jefferson, Schenectady, N. Y., assignor to Mica Insulator Company, New York, N. Y. A method of treating scales or pieces of mica or similar material to prepare them for adhesive union with each other or with other articles, consisting in applying to said pieces an adhesive substance, and subjecting said pieces individually with the applied adhesive substance to the action of heat, whereby the surface of each of said pieces will be independently covered with adhesive material.

764,811. MEANS FOR TREATING PIECES OF MICA TO PREPARE THEM FOR ADHESIVE UNION WITH EACH OTHER OR WITH OTHER ARTICLES.—Charles W. Jefferson, Schenectady, N. Y., assignor to Mica Insulator Company, New York, N. Y. A machine for treating scales or pieces of mica or similar material to prepare them for adhesive union with each other or with other articles, consisting of a support for said pieces, a heating device and means for producing relative movement between said support and heating device to enable said support and the pieces resting on the same to be within the sphere of the heating device, but without coming in contact with the same, whereby an adhesive on the surface of said pieces may be caused to adhere to said surface.

764,850. FEED MECHANISM FOR ROLLING-MILLS.—Sigmund V. Huber, Pittsburg, Pa. A feed-table for rolling mills having in combination a series of continuously-rotating feed-rollers, a stop mechanism operative on the article intermediate of its ends; for preventing the onward movement thereof by the feed-rollers, arms for shifting an article laterally from the feed-rollers, and mechanism for simultaneously shifting the stop mechanism to release the article and the arms to shift the article when released.

764,907. HOISTING-BUCKET.—Gustaf P. Wern, New York, N. Y., assignor to Rawson & Morrison Manufacturing Co., Cambridgeport, Mass. The combination with the two parts of a hoisting-bucket, shaft by which said parts are pivoted together, hoisting-chain, and bucket-opening chain, of the head-block having the body part in the extremities of which the bucket pivot-shaft has bearings in close proximity to the bucket-pivots respectively, and the shieve-housing part carrying the shieves of the bucket-closing chain independently of the pivot-shaft.

764,913. SOLUTION FOR PRESERVING LUMBER.—Sidney B. Chapman, Abbeville, Ga. A germicidal and preservative compound for sap-lumber comprising solution of water, sulphuric acid, mercuric chloride and salicylic acid.

764,973. DEVICE FOR SEPARATING SLIMES IN ORE REDUCTION.—Oliver P. Ankeny, Deadwood, S. D. A filtering-cell comprising a peripheral frame; a filtering-web covering the opposite sides of said frame and secured to the bars thereof; bars extending across said frame between the webs for spacing the latter apart, and clamping-bars outside the filtering-web binding the latter to the edges of the spacing-bars.

764,975. ELEVATOR-BUCKET.—William G. Avery, Painesville, Ohio. In a bucket a body portion formed of an integral blank, having oppositely and inwardly projecting flanges at both ends, said flanges extending from the upper portion of the body to a point near the bottom thereof and having a portion of the lower end of the body cut away in such a manner as to leave individual or separate lugs with end pieces adapted to engage and be secured to said flanges and lugs.

764,979. ORE-CONCENTRATOR.—Samson Beer, Butte, Mont. In an ore-mill, a pan, a driving-shaft extending vertically through the pan, a hub surrounding the shaft, a cap on the hub, a screw operating in said cap and engaging the top of the shaft for moving the hub vertically, a cylindrical part attached to the hub and having side openings, cheek-pieces extended outward from the sides of the openings, bearing-boxes mounted to rock in said cheek-pieces, and rollers having their shaft-bearings in said bearing-boxes.

764,986. ARTIFICIAL FUEL.—Francis J. Bulask, Toledo, Ohio. A composition of matter for fuel, consisting of combustible material and double silica and lime.

765,000. PROCESS OF MAKING COPPER SULPHATE.—Gustave Gin, Paris, France. A process of obtaining sulphate of copper from sulphur ores or mattes, which consists in roasting the ores in an oxidizing atmosphere until the sulphur is dispelled from the ore, cooling the roasted ore in contact with the gases from the roasting to form sulphate of copper and ferric sulphate; lixiviating the mass thus formed, then digesting the solution with ore previously roasted to complete oxidation whereby sulphate of copper is formed and peroxide of iron is precipitated.

765,001. PROCESS OF MANUFACTURING VANADIUM AND ITS ALLOYS.—Gustave Gin, Paris, France. A process for the electrical manufacture of vanadium alloys which consists in subjecting an anode made of an agglomerated mixture of carbon and vanadium oxide to electrolytic action in a fused bath consisting of calcium fluoride and a fluoride of the metal with which the metal is to be alloyed, introducing the metal with which the vanadium is to be alloyed, in a metallic state in proximity of the cathode, and tapping the resultant alloy product.

765,013. MAGNETIC ORE-SEPARATOR.—Frederick J. King, Croydon, England. A magnetic separator comprising a set of magnet-bars for sorting the material, and another set of curved magnet-bars at right angles to the first set and overlapping the lower end of said first set for the purpose of separating the sorted material.

765,042. ORE-CONCENTRATOR.—Fred N. Rogers, Denver, Colo. Filed March 3, 1902. In an ore-concentrator, the combination with a plurality of independent classifying concentrating-surfaces arranged for progressive concentration, of means for independently shaking the respective concentrating-surfaces to impart classifying movement to the pulp-particles, and a conveyer adapted to convey and deliver desired portions of the more or less classified pulp in a sheet from one concentrating-surface, without substantially intermingling or disturbing the existing classification thereof, to a succeeding concentrating-surface, thereby effecting a progressive concentration over the successive concentrating-surfaces.

765,069. CONVEYER.—James M. Dodge, Philadelphia, Pa., assignor to the Link Belt Engineering Company, Philadelphia, Pa. A conveyer-bucket having a pocket extending from one end of the same and below its upper edge.

765,151. AUTOMATIC ATTACHMENT FOR ELEVATOR-BELTS.—James B. Soule, Minneapolis, Minn., assignor of one-half to the Central Machine Works Company, Minneapolis, Minn. A governor or automatic trip device having a centrifugally-actuated element, and automatic means for positively agitating the said element, to prevent sticking thereof.

CONCENTRATION OF SULPHURIC ACID.—The use of porcelain vessels to replace platinum for the last stages of the concentration of sulphuric acid (to a density of 1.83 to 1.84, R.) is described by Hartman and Benker in *Revue des Produits Chimiques* for February, 1904. The Benker apparatus consists of two cascades, each of 20 porcelain vats or troughs, which rest on supports of refractory material and are thus protected from direct contact with the heat. These supports are so arranged that they completely separate a lower passage carrying the hot gases from the fire from an upper in which are the vats, and through which pass the products of distillation. The sides and the vault of the upper passage are lined with volvic lava. On the upper side the two cascades are separated by a longitudinal wall. The products of distillation from each of the passages containing the cascades go to a recuperator, which is simply a lead chamber of about 12 cu. m. capacity filled wth coke. The output of this apparatus is seven to eight tons of 92 per cent. acid or five to six tons of 94 to 95 per cent., or four tons of 97 to 98 per cent in 24 hours, with an expense for coal of 15, 20 and 25 per cent respectively. The acid obtained is cleaner than that made by the use of platinum vats. The price of a plant capable of turning out seven to eight tons of 92 per cent acid daily is, in France, about 12,500 fr., as compared with 250,000 fr. when platinum is used.

SPECIAL CORRESPONDENCE.

San Francisco. July 14.

(From Our Special Correspondent.)

The latest mine in the State to have trouble with its men is the Jumper at Stent, Tuolumne county, of which Mark B. Kerr, formerly of the United States Geological Survey, is manager. He insisted that all men working underground should be able to speak and understand the English language, so that they could know what spoken or printed orders meant, as a measure of safety for the men and the company. Early this month the management posted notices that all underground workmen would be required to strip naked in passing through the change room in going off and on shift, and that underground men would be notified by light signals when to quit work and when to resume at lunch time, making the regulations underground the same as on top. The first of the notices resulted in the calling of a special meeting of the Tuolumne miner's union, and about 150 men struck on July 3.

In a hydraulic mine near Quincy, Plumas county, a quartz ledge is reported carrying values which makes the property more valuable for quartz than for gravel; in fact, the owners think the property is worth five times as much as before the ledge was found.

The floods last February carried out the dam on the North Yuba river, which supplied power for the electric light plant, and the water has remained so high that the work of reconstruction could start only within the past few weeks. A temporary dam is to carry the water past the proposed new dam. After turning all the water possible from the main channel the men are going to work the bed of the stream for gold. The old dam has been in place since the early 50's, and that part of the channel was never worked except in a crude way. Enough gold may be recovered to pay for the new dam and works.

The local papers are out with a story that the Mountain Copper Co., of Shasta county, will remove its entire smelting plant from Keswick, Shasta county, to San Francisco bay, but Mr. Lewis T. Wright, manager, has made no definite declaration of such purpose. It is a 200-mile haul from Keswick to the bay shore and the smelters at Keswick would be removed at great cost. It seems pretty certain that the company will have a smelting plant at Bull's Head point, and certain custom work may be done in competition with the Selby Co., besides working some of its own ore high in sulphur. If the smelter should be moved the people of Shasta county will have something to say to the local newspapers which have been pitching into the copper company about its fumes on all sorts of occasions. The removal of these works, and the hundreds of laborers employed would be a serious blow to the county. The new location is an ideal one, with two transcontinental railroads passing in front and deep water for vessels.

Owners of dredging land and county assessors continue to differ. The latter have been so raising the valuation of possible dredging lands that the owners protest loudly. For example, the manager of the Natoma Vineyard Co., Sacramento county, now bonded for dredge purposes, has protested that some of the land assessed for mining is not fit for mining at all, as much has been sluiced out and is useless. He said that 6,500 acres of the Natoma company had been bonded for dredging purposes, but that it was unfair to assess the property until the outcome of the dredging developments is known and asked to have the assessment reduced 50%. A large part of the grazing and vineyard land had been assessed as mining ground at a high valuation before it had been proved worth anything for mining.

The dredge miners along the Feather river about Oroville employed surveyors to examine charges of damage to farmers living lower down the stream. The report has not been made public, but it is said that the surveyors decided that the dredgers could not possibly have sent down the amount of sand, etc., which now covers certain farms. About 300 acres are involved in the covered area and the area dredged was only some 160 acres.

The Ione & Eastern Railroad Co. has let contracts for grading and building a road from the main line at Ione, Amador county, to Jackson and Sutter Creek. This will be a great thing for the Mother Lode mines in that section, where teaming over bad roads adds much to the cost of mining machinery and supplies.

Several quicksilver claims were located in Nevada, just east of Fort Bidwell, Modoc county, Cal., years ago, but no permanent deposits was found. Now Pederson & Baty think they have found an unbroken part of the ledge. They have been running a retort and are preparing to put in a furnace. Some of the ore looks like the best taken from the old mines at New Almaden years ago, but how much of this ore is to be found is a question. Naturally, with even a small amount of 80% ore in sight the prospectors hold their claims at all sorts of high figures. Quicksilver mine owners in California are glad to get 1½% ore regularly; not many of them are doing that.

Denver. July 16.

(From Our Special Correspondent.)

William D. Haywood, secretary of the Western Federation of Miners, returned a couple of days ago, from a trip to Chicago and the Black Hills. Shortly after his arrival Sheriff Bell, of Cripple Creek, came to this city and warrants for the arrest of Haywood and O'Neil were served. Bonds, respectively for $10,000 and $5,000, were furnished. The affairs of the Federation have been turned over to Moyer and Haywood again. Mr. Mannix, county clerk of Teller county, who was deported by the Citizens' Alliance, has not abandoned his determination to retain his office, but will, for the present, not return to the district. The first important arrest in connection with the Independence affair was made on July 10, when Pearl Skelton was captured in Pueblo county. It is claimed that Skelton assisted in placing the dynamite. Frank J. Hangs, the leading counsel for the Federation miners, served notice on July 13 that he will institute habeas corpus proceedings in the cases of a number of prisoners against whom no charges have yet been preferred.

George E. Kyner, editor of the Victor *Record*, asked military protection from General Bell, which was at once furnished. Kyner's office was partially destroyed at the time of the riot. There seems to be a bitter feeling in other districts against the men who have been deported from Cripple Creek. A few days ago, one who was among the batch taken to the Kansas line was driven out of Idaho Springs. The rumor that the headquarters of the Western Federation are to be moved to the Black Hills, is contradicted by its officers, who have secured new quarters in this city. Of the 40 men charged with having participated in the riots at Victor and vicinity, 12 were held without bail for the next term of court by Judge Cunningham, who fixed the bail for 10 at $10,000 each, and for the 18 others at $5,000.

Jesse W. Shields has been arrested at Silverton for the murder of Arthur L. Collins, manager of the Smuggler-Union mine, and also for the murder of J. W. Barney, a deputy sheriff. A detective agency is said to have secured evidence against him in the Collins case, on which he will be tried. Barney's remains have never been found.

The general offices of the Denver & Southwestern Railroad, operating the lines connecting the Denver & Rio Grande and the Midland systems, with the Cripple Creek district, will, on Aug. 1, be moved from here to Cripple Creek. They have been in Denver since the consolidation.

The Colorado & Southern Railroad has just announced a reduction in ore rates to the Denver smelters from Gilpin county and Idaho Springs. The rate has been changed from $1 per ton on concentrates going below $10 per ton, to 75c. on ore under $9. The rate on ore worth over $10, which was $1.50, has been lowered to $1, and extends to $20 ore. This concession will undoubtedly increase the tonnage considerably.

The George Crocker Summer Mining School, at Silver Plume, is being attended by about 85 students from the Columbia School of Mines, the Massachusetts Institute of Technology, the Sheffield Scientific School at Yale, and the Lawrence Scientific School, Harvard. Prof. Henry S. Munroe, of Columbia, has personal charge. After finishing their studies at some of the mines at Silver Plume, the students will give some time to methods of concentration at Idaho Springs, hydraulic mining operations on the Blue and Swan rivers in the vicinity of Breckenridge and the gold mines of Cripple Creek before returning East. Dr. Ford, of Yale University; Mr. White, of Harvard, and Mr. Locke, of the Institute of Technology, are assisting in the work.

Some rich discoveries are reported in the western part of Clear Creek county, near Berthoud pass, at a very high altitude, within about 6 miles of the location line of the Moffat railroad.

Mr. Philip Bauer, of Hamburg, Germany, has just visited Denver, calling on the principal rare mineral producers. He said that he was well repaid for his long journey and closed transactions involving the purchase of tungsten and other ores.

Duluth. July 16.

(From Our Special Correspondent.)

It is interesting to note that last year the Pittsburg Steamship Co. put one of its 3,500-ton steam vessels in the Escanaba trade when freights from that port were 60c. a gross ton. This ship's earnings were computed for nine consecutive trips, and it was found that she had lost 2c. a ton, actual costs having been about 62c. Charges against the ship were then a trifle higher, the unloading charge, for instance, being 21c. a ton against 19c. now. This week the freight from Escanaba reached 50c. a ton, and owners of even fair-sized ships of the better class are carefully keeping out of it. An effort is made to establish the rate from Marquette to Lake Erie at 60c. a ton, a decline of 5c. The steamship *A. B. Wolvin* has just delivered at South Chicago docks of the Illinois Steel Co., a cargo of 11,083 gross tons of iron ore from Escanaba, on a draft of 20 ft. It is possible to load to greater depth between these ports than on the run from Lake Superior to Lake Erie, where the Lime Kiln crossing, near Detroit, keeps draft at 19 ft. The *Wolvin's* cargo is to be compared with that of the *Wm. Edenborn*, of the Steel Corporation fleet, delivered at South Chicago last summer, amounting to 8,800 gross tons. The *Wolvin* was built on a guarantee of 10,000 gross tons on 19 ft., and can evidently do it easily. The advent of the larger ship adjusts freight rates, and the smaller vessels are adjusted out of profits, unless the demand for vessels keeps up rates, which is not the case this year. With a concern like the United States Steel Corporation, willing and able to supply itself with ships, if its ideas on rates are not given due consideration, there seems little probability of high freights for a long time; but there is the constant danger that fleets having no connection with tonnage producers, either ore, coal or grain, may be without stuff to carry at any rate, and this fear is apparently felt to-day by some of the large independent vessel owners.

Daily shipments of iron ore from docks at the head of Lake Superior, amount to between 90,000 and 95,000 gross tons. Duluth, Missabe & Northern docks lead, with an average shipment of about 40,000 tons. Between 50,000 and 60,000 tons a day are going over the docks of the roads that reach the lakes at Ashland, Marquette, Presque Isle, Escanaba, Wells and Gladstone. This large business is liable to be maintained for some months.

Stock piles are running off fast, and in some cases are nearly gone. There has been trouble recently from frost in these piles, as shipments have been so fast. When stock piles are exhausted and the daily shipment comes from daily hoists there will be a slight falling off in traffic.

Shipments this season from the Pickands, Mather & Co. active mines on the Menominee range will exceed last year's by nearly 100,000 tons. This increase will come from Vivian, Baltic and Hemlock mines. The company is shipping heavily from its Mesabi range mines and will continue throughout the season. It has abandoned Verona mine and this reverts to fee owners.

Salt Lake City. July 15.

(From Our Special Correspondent.)

The railroad companies operating in Utah have made some important concessions in freight rates to the copper shippers, bringing rates to those paid by Montana shippers—$10 per ton. Heretofore $14.35 per ton has been exacted on bullion transported from Salt Lake City to New York. The new rate means a saving to Utah shippers of approximately $30,000 per annum.

The directors of the Copper Mountain Mining & Milling Co., with properties in Beaver County, have taken steps to clear up the corporation's indebtedness, amounting in all to about $6,000, and have called upon the stockholders for an assessment of 1c. a share, or $7,000. The Copper Mountain has suffered from unwise management. It is well equipped and was one time said to have the best showing of copper ore in the Beaver Lake mining district.

The Utah Copper Co., operating in the copper-bearing porphyries of Bingham, has made its final payment on the purchase price of one-half interest in the ground, owned heretofore by Col. E. A. Wall, of Salt Lake City, who has drawn down a check for $360,000. After the transfer, a trust deed issued to the Colorado Title & Trust Co. was filed with the county recorder of Salt Lake county, which was given as security for the redemption of $750,000 worth of first mortgage 7% gold bonds, the proceeds from which are to be applied for further improvements, including an enlargement of the mill. The bonds become due in 20 years from July 1, 1904, and are to be issued in denominations of $1,000 each. It is agreed in the deed of trust that on January 1, 1906, and annually thereafter the copper company is to set apart and reserve out of the gross earnings 10c. per ton net on all ores treated during the preceding year, this sum to be placed in a sinking fund for redeeming the bonds. The present officers of the Utah Copper Co. are: Charles M. MacNeill, president; Enos A. Wall, vice-president; Spencer Penrose, secretary and treasurer; D. C. Jackling, general manager; Frank Janney, superintendent. Col. Wall still retains stock for 40 per cent. of his original holdings in the property.

The mine operators of Alta are discussing the organization of a company to drive a drain tunnel about 4 miles long that would tap the ore-bodies of some of the principal properties at a depth of from 2,000 to 2,500 ft.

The county commissioners of Salt Lake county have appointed as delegates to the American Mining Congress, to be held in Portland, Ore., next month, Dr. J. E. Talmage, of the University of Utah; R. H. Channing, manager of the Utah Consolidated, and Tony Jacobson, manager of the Columbus Consolidated mines.

An order of court will be made within the next few days discharging the receiver of the Majestic Copper Mining & Smelting Co. The development of the mines will begin at once along systematic lines. Ed. Freudenthal, of Pioche, Nev., has been appointed superintendent.

The Boston & Maine property at Galena, Nev., owned principally by Salt Lake people, is likely to be consolidated with the White Shiloh property. The latter was an important producer in the early history of the camp. William A. Eckman, superintendent of the former, is the owner of the latter.

Bisbee. July 14.

(From Our Special Correspondent.)

The Shattuck-Arizona Mining Co., which has just begun work, reports finding manganiferous iron close to surface in a pit near its south line. The company looks for ore with more assurance, as in the Uncle Sam claim of Copper Queen, near the Shattuck, the same rock was found at considerable depth.

The Bisbee West mine management announces that it proposes to sink a shaft 2,000 ft., or far below any strata in which the geologists believe there is a possibility of ore, and deep into the underlying schist. At present Bisbee West is idle and the general supposition is that it has little money on hand.

Pittsburg & Duluth's ore finds have grown in size and importance, and the indications favor a considerable body of ore making down from its ground into Lake Superior & Pittsburg. Exploration underground is proceeding with vigor.

The reports circulated here and at Lake Superior that the Houghton Development Co. had cut ore running up to a gross value of $500 per ton in copper, gold and silver, are incorrect.

Calumet & Sonora, which is developing a property 4 miles southwest from the mines of the Green Consolidated, is in sulphide ores at the depth of 40 ft. The surface was iron pyrites, and there was a thin seam of malachite and cuprite at 10 ft. from surface. The company is pushing development. M. L. Fay, of Minnesota, is president.

Toronto. July 16.

(From Our Special Correspondent.)

The Ottawa members of the Canadian Society of Civil Engineers held a meeting in that city on July 11 to make preliminary arrangements to entertain the members of the Institute of Civil Engineers, from England, who will spend five days in Canada on the invitation of the Canadian Society. They will be in Ottawa on Sept. 22. Reception, entertainment and finance committees were appointed. The program mapped out includes visits to the leading factories and water-power sites.

The Cramp Steel Co., of Collingwood, Ont., the operations of which have for some time been suspended, is to be reorganized under the name of the Northern Iron & Steel Co. The North American Trust Co. holds a mortgage on the plant which is liable shortly to be foreclosed. A committee of stockholders, including Duncan Donald, J. A. Currie, Wm. Liddington, W. J. Lindsay and J. T. Duguid, with F. A. Hall as secretary, has issued a circular outlining the reorganization project as the only means of protecting stockholders' interests The authorized capital of the new company is placed at $2,500,000, half of which will be ordinary stock and half preferred 6% stock, with dividends payable quarterly. Sufficient proxies have been obtained by the committee to ensure the co-operation of the majority of the stockholders at a meeting shortly to be held.

New regulations governing the right to use and divert water for mining purposes in the Yukon have been issued by the Dominion government. It is provided that the owner of any ditch or water-privilege may distribute water to such persons and on such terms as he may deem advisable, within the limits mentioned in his grant, on condition that he shall supply water to all miners applying therefor in a fair proportion, and shall not demand more from one person than from another, except where the difficulty of supply is enhanced. The rates to be charged shall be subject to revision and control from time to time by the government.

C. D. Warren, president of the Lake Superior Corporation, who has been in Toronto from Sault Ste. Marie, states that the Helen iron mine has resumed work and is producing from 800 to 1,000 tons per day. Cornelius Shields, the general manager, has taken control. The steel works will be able to turn out rails in about three weeks' time. The company hopes that the Provincial Government of Ontario will renew the order given over a year ago for rails for the Temiskaming & Northern Ontario Railway. Most of the other industries are in operation and the remainder will resume as soon as possible. The Elsie and Gertrude nickel mines near Sudbury are being pumped out. President Warren will have an office in Toronto.

W. E. H. Carter, of the Ontario Bureau of Mines, has returned to Toronto, after a three weeks' tour of inspection in New Ontario. He reports that the Massey Station Mining Co. is erecting an Elmore oil concentrator of a capacity of 50 tons of ore per day at Massey Station, Algoma district, for experimenting on silicious chalcopyrite, and is also carrying on further experiments in smelting this ore at the Victoria mine nickel-copper furnaces. This ore-body, having a quartz matrix and lying in a diorite country, in or close to the contact with the ancient quartzites, is typical of many copper-pyrite veins throughout the district north of Lake Huron. Generally speaking, chalcopyrite is the only sulphide present, and is for the most part finely disseminated and not suitable for any process of wet concentration, since a great deal of sulphide slime floats off and is lost. The strong point of the Elmore process is its ability to save fines, and it is expected to be especially applicable to these copper ores.

An official statement recently made in the House of Commons, Ottawa, by Sir Richard Cartwright, gives the total amount paid by the Canadian government in bounties to the Dominion Iron & Steel Co., since it began to manufacture in October, 1901, up to the end of May last, at $1,721,556.

The Ashland Emery & Corundum Co., incorporated under the laws of New Jersey, has been licensed to carry on business in the Province of Ontario on a capital not exceeding $75,000.

The Foley gold mine, in the neighborhood of Fort Frances, is to be reopened. A trip of inspection recently made by President Bowden, accompanied by the secretary of the company, satisfied him that it would pay to operate the property, and the shaft is to be pumped out at once.

Victoria. July 12.

(From Our Special Correspondent.)

Atlin.—W. J. Robinson, of the British-America Dredging Co., operating on Pine creek, states that Dixie creek, beyond the boundaries of the auriferous area now worked, is likely to become an important producer. It is said coarse gold has been found there. The company proposes installing a dredge on Dixie creek, where is ample water for the development of power. The company also announces its intention of operating two additional dredges on the Atlin leases at an estimated cost of $500,000. The British Columbia Dredging Co. is installing a dredge on Spruce creek.

Cariboo.—Prospects for a successful season are reported most promising, the hydraulic mines near Barkerville having plenty of water. Good reports come from China and other creeks. The last report from the manager of the Cariboo Consolidated is encouraging, bedrock having been reached in the west drift of La Fontaine, where values have increased to $14 per cu. yd.

Lardeau.—A 5-ft. vein of free-milling gold quartz is reported near Ferguson. Another lead 8 ft. wide yielding $10 in gold has been opened on the Swede group at Poplar creek.

Slocan.—The Slocan Star at Sandon is now employing 70 miners and shipping 500 tons of galena and 600 tons of concentrates to the Trail smelter. The company has installed machinery to the value of $15,000 this year. The cable for a 1,900-ft. tramway at the Last Chance is being installed. In the Slocan City division, the Rockland group of three claims has been acquired by an American syndicate, that proposes starting development. A test of 100 tons of free-milling gold ore from the Kilo is about to be made at the Chapleau mill.

Nelson.—The Tamarac Mines, Ltd., has submitted a financial statement for the financial year, ending March 31, 1904, showing a balance in hand of $536. During the year $1,690 was expended in mine development.

Rossland.—The announcement is made that the Canadian Smelting Works contemplates beginning the manufacture of lead pipe, and possibly sheet lead, within the next few weeks. Negotiations are also in progress for the establishment of corroding works at Montreal. Last week a shipment of 70,000 oz. of refined silver was consigned from Trail to China. Magnetic separation of Le Roi ores is to be tried. It is thought that a previous roasting will be required. The Centre Star Co. is suing the Rossland branch of the Western Federation of Miners for damages done the plaintiff's business through the defendants' ordering and carrying on a strike in 1901. The case will probably be carried ultimately to the Privy Council. A verdict in favor of the plaintiffs would be a severe blow at labor unions in Canada.

Boundary District.—At the sheriff's sale of the Winnipeg mine last week no bids were made. Arrangements are under way for installing electrical machinery at the Providence mine. At the British Columbia Copper Co.'s Mother Lode mine, diamond drilling is in progress at the 300-ft. level. The company is now shipping its product as blister copper.

Monterey. July 13.

(From Our Special Correspondent.)

It is understood that J. W. Malcolmson, of El Paso, Texas, is authority for the statement that the smelter treatment charges on ores in the northern part of Mexico, and the production of the mines of that section call for a larger smelting capacity, and that probably the only solution of the difficulty will be the erection of an independent smelter at some point in the State of Chihuahua. As Mr. Malcolmson was appointed by Enrique C. Creel, Governor Terrazas and others of Chihuahua, to gather information on this subject, his remarks may be taken as an unofficial statement of his recommendations. The principal drawback in the plans is the scarcity of lead ores in that part of the Republic, and what seems to be a changing of the ore-bodies of some of the large producers from a lead to a zinc excess. The production of iron and copper sulphides, however, and the introduction of matte smelting may obviate the difficulty. The two new camps of Amloloto and Naica are rapidly increasing their lead output.

In Sonora several smelters are contemplated. The Cananea Consolidated Copper Co. is preparing to increase its output from 80 to 120 tons of copper per day, necessitating an increase in the smelting plant and a 200-ton concentrating mill for low-grade ores. The Yaqui Copper Co. is said to have placed with the Allis-Chalmers Co. an order for a 500-ton smelting plant at Campo Santo Niño, and a number of retaining dams and reservoirs are being constructed to conserve water. The work is in charge of two former Black Hills, S. Dak., men, Wm. Sauntry and W. E. Pomeroy, as president and superintendent respectively The Cieneguita Copper Co., of which G. D. Beebe, of Chicago, is president, is preparing for a 200-ton smelter for its property 100 miles east of Minas Prietas in the Sahuaripa district. El Tigre Consolidated Gold Mining Co., is contemplating the erection of a large concentrating mill at Bavispe. The Providencia has raised $25,000, gold, for continuing development work.

In Oaxaca a smelter project is being pushed by the owners of the Louisiana, New Orleans and Emilio, in the Nochistlan district, who are now in New Orleans to organize the New Orleans Mining, Milling & Development Co., with $1,000,000, gold, capital. Dr. T. J. Carey, Jr., will be president, and A. C. Watson, vice-president. New work is to be started in the Sierra Juarez district, wherein money was made years ago by the use of the old German barrel process. A rich strike is reported from La Union y Anexas, assaying something like 500 oz. in silver and 8 oz. in gold per ton. The Escuadra is temporarily closed by a lawsuit.

Zaragoza. June 15.

(From Our Special Correspondent.)

There has been quite a boom in placer mining in the River Nechi district, department of Antioquia, Colombia, for the past few months. In February Mr. Edward Emmerson arrived to take charge of the Santa Margarita mine, which belongs to the Santa Margarita Gold Mining Co., of New York City. This mine is to be equipped with pumps which will supply water for the monitor to work the alluvial deposits. About 14 men are employed clearing ground for the boilers and pumps.

In March Mr. Leo Goldsmith arrived to take charge of the Barrena mine, which belongs to the Barrena Mining Co., also of New York. The water for the monitors at the mine, three miles from the river, will be supplied by Worthington pumps, 1,500 gal. capacity. A wagon road is being built, over which the machinery is to be carried. Fourteen men are employed clearing a space for the machinery. At this mine the general custom in this department of feeding the men has been changed. The superintendent, after a year's experience at one of the other mines in the department, concluded that the custom ought to be abolished. Accordingly small houses were built, one for each pair, man and woman. Heretofore it has been the custom to house them in one large building. A store has been opened where provisions and supplies can be bought at reasonable prices. Thus far the laborers like the change, and it is an advantage to the company, as heretofore there has been trouble with the cooks, who put aside a great deal of food for themselves so that the men were always complaining of the rations being small. The old plan also required two dispensers, two cooks and a laborer, who supplied wood and water for the kitchen, while now the store makes enough to pay the store keeper, and the dispensers, cooks, and laborers are not needed. At the other mines the wages are 30 to 40 pesos per day (equivalent to 30 to 40c.), and food costing 30 to 35 pesos. At this mine the wages are 65 to 75 pesos. It will not be long before the other mines in this district will follow this innovation.

In April Mr. McCormick arrived to take charge of the Bertha hydraulic mine owned by the Bertha Gold Placer Co., of New York City. The water for the giant is supplied by a large dam; 20 men are employed.

In April Mr. Frank E. Wilson arrived to take charge of the Tortugeros mine, which belongs to the Fortuna Gold Placer Co. This mine is near the village of La Llano. In April, Mr. Hazzard, director general of the San Carlos mine, near La Llano, arrived with boilers and pumps, which are to be used to supply water for several monitors. This mine is now being worked with one monitor, producing from 250 to 300 oz. per month. It was recently sold by a French syndicate for $100,000. It is the oldest mine in this district.

Mr. Gustave Wasserlein is superintendent of La Sinebra mine, owned by a New York company. About 30 men are now employed. The monitor is expected to be in operation shortly, the water for the grant being supplied by a large dam.

Mr. William Guilford is superintendent of the San Pedro mine, owned by a Boston company. A small force of men is employed completing the ditch. The monitor is expected to be at work shortly.

Mr. Arthur Davidow is superintendent of the Santa Barbara mine, a ground sluicing enterprise, owned by the Santa Barbara Gold Placer Co. A large force of men is employed. The mine has been in operation several years.

All of the mines mentioned are near the village of Zaragoza, which is on the River Nechi, 300 miles from Barranquilla. The river is navigable to Zaragoza.

London. July 9.

(From Our Special Correspondent.)

It is satisfactory to be able to record that the Mond Nickel Co. has now arrived at a dividend-paying status, and that its financial position is assured. The report for the year ended April 30 last shows that a profit of £17,000 was made. This is sufficient to pay the interest on the 7% preference shares, and to write off some of the preliminary expenses of the company. The difficulties at the refining works in South Wales have been overcome, as regards both the economic working of the Mond process and the prevention of the escape of poisonous fumes, which caused so much anxiety last year. The company now produces nickel and sulphate of copper of high quality and has no difficulty in disposing of the products. The works at Swansea have been in continuous operation since August last, and several extensions have been made, so that the output of one product shall keep pace with the others. Owing to the fact that the mines and smelters in Ontario have been in operation for a much longer time than the refinery in South Wales, the stock of matte is a long way ahead of the refinery capacity, and it has therefore been deemed advisable to stop mining and smelting for some time. The mines are reported to be in excellent condition, and the ore supply ready for stoping is greater than this time last year. At the meeting of shareholders held this week it was gratifying to find the chairman, Dr. Ludwig Mond, in his place once more. The worries and anxieties in connection with this company, and also in connection with the Bischoff white-lead process, completely broke down his health some time ago, and he spent many months traveling abroad where business cares could not follow him. The establishment of the Mond Nickel Co. on a sound commercial basis has, however, been the best medicine imaginable.

The Delamar Co., working the mine at Delamar, Idaho, is still extracting values and making profits from the mine. The mine was a great success in its day, and paid large dividends from 1891 to 1896. After that the veins became of lower grade, and the original rich veins became exhausted. From 1897 to 1901, profits were made by treating the low-grade ores and by cyaniding the tailings heaps, and dividends at the rate of 2½% to 5% were paid on the nominal capital of £500,000. In 1901 it became evident that the mine was near its end, and the directors decided to reduce the nominal capital of the company to £80,000, to bring it more nearly equal to the actual assets. Since then they have been on the lookout for new properties, but so far nothing suitable has been obtained. In the meantime, the old mine has still been worked at a profit, and during the last three years dividends amounting to 35%, 10% and 17½% have been paid on the reduced capital. In addition to this distribution, there is now £61,000 cash in hand, ready for the purchase of a new property. During the past year 36,000 tons of ore have been treated, yielding a gold and silver extraction of $8.74 per ton. A large proportion of the ore treated came from the pillars of the old stopes, but some of it came from small ore-bodies, the existence of which was revealed as the pillars of the old workings were removed. Mr. Orford is to be congratulated for his efficient management of a property, the prospects of which would not induce good work from most mine managers.

The reorganization of West Australian companies continues apace, and the control is gradually being taken out of the hands of the promoters and makers of markets. This week the Peak Hill Goldfield, Ltd., has been occupying the attention of the public. When the company was formed in 1897, Mr. D. Simpson, the vendor, received over 80,000 shares of £1 nominal value, and he has disposed of the bulk of these at prices ranging from £1 to £3. The mine is situated about 120 miles by road north of Nannine. The ore during the last year or two has been quarried rather than mined, and though it appears to exist in large quantities in the open cut the contents vary widely over every foot of rock. Nevertheless, the returns have been fairly regular, averaging 3,000 oz. per month. Altogether, dividends amounting to 65% on a nominal capital of £300,000 have been paid; but on the other hand, when additional funds were required a year or two back, recourse was had to the issue of new capital. It may be said, therefore, that, on its original capital, the mine has not done more than pay its way. A few months ago Messrs. Alexander Hill & Stewart, who are known to American readers in connection with Le Roi No 2, were commissioned, on behalf of leading shareholders, to examine and report on the property. They recommend that the property shall be thoroughly explored at depth by means of new shafts, in order that richer ore known to exist in the lower workings shall be developed. In order to provide requisite funds it is proposed that £50,000 in 6% debentures shall be raised.

Perth. June 6.

(From Our Special Correspondent.)

The gold yield of the State for May was 191,782 oz.

Kalgoorlie.—The rich body of ore recently struck in the Boulder Deep levels at 900 ft. has been followed about 240 ft. The Associated at the 1,000-ft. level has carried the drive on the Brownhill run of ore to the boundary and connected with the Oroya workings. The pay ore is 16 ft. wide. The other ore-body cut at this level recently is 20 ft. wide. In the Kalgurli at the 1,050-ft. level the ore runs 24 dwt. per ton. In the rise above the 1,000-ft. level the ore-body averages over 40 ft. wide. In the Lake View Consols the ore body at the 1,400-ft. level averages 15 dwt. per ton. The Boulder Perseverance ore reserves are estimated at 40,000 tons, containing 375,000 oz. gold.

Kookynie.—R. J. Grant, from Colorado, has taken over the management of the Cosmopolitan mines, in place of Mr. Shipman, who has taken the Golden Horseshoe management. The Sons of Gwalia ore reserves are estimated at 345,580 tons, averaging 50s. ($10) per ton.

Boring for oil at the Warren river is going on well, and indications at 900 ft. are very encouraging.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodations in the city of London.

Copies of Volume 75 of the ENGINEERING AND MINING JOURNAL, covering the period from January 1 to July 1, 1903, are wanted. Persons having such copies to sell will please send word to the office, 261 Broadway, New York City.

PERSONAL.

Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. S. F. Emmons is at Denver.

Mr. Forbes Rickard was at Dragoon, Ariz., last week.

Mr. E. Gybbon Spilsbury has returned from the West.

Mr. T. A. Bennett has returned to New York from Peru.

Mr. F. D. Weeks is at Marysville, British Columbia.

Mr. R. T. Bayliss arrived from London by the *Oceanic* on July 20.

Mr. Frank K. Borrow has left Bulawayo and is now at Johannesburg.

Mr. Chas. M. Rolker is leaving London to proceed to South Africa.

Mr. H. B. Price is now manager of the Bonanza mine, in the Transvaal.

Mr. W. Pellew-Harvey sailed by the *Majestic* on July 20 for London.

Mr. W. Denham Verschoyle has returned to Seattle, after a long trip in Alaska.

Mr. Ira C. Boss has left New York to erect a mill at Goldfield, near Tonopah, Nevada.

Mr. G. A. Tweedy, of Los Angeles, Cal., has gone to Butte county to investigate mines.

Mr. C. W. Wheelock, of the Engineering Company of America, is at Roanoke, Virginia.

Mr. J. B. Brown, of St. Louis, is visiting mines in the Warren mining district of Idaho.

Mr. Felix Kwast, of Berlin, arrived by the *Graf Waldersee*, and will proceed to California.

Mr. D. B. Huntley has returned from Rhodesia, where has been for the last two years and a half.

Mr. E. W. Sebben, of Denver, is at present on professional business in the Tomichi district of Colorado.

Mr. Samuel B. Christy, professor of mining at the University of California, is visiting New York City.

Mr. Lloyd M. Chapman, of Orange, N. J., has returned from a journey to New Zealand and Australia.

Mr. Robert Curnow, formerly at the French Rand, has been appointed manager of the Nigel, in the Transvaal.

Mr. G. C. Hewett expects to return to Colorado Springs by July 15, after spending a week at Bisbee, Arizona.

Mr. John F. Allan, of Mexico City, is examining mines in the Pinal de Amoles district of Queretaro, Mexico.

Mr. Henry Louis, professor of mining at the Durham College of Science, England, is in New York, on his way to Canada.

Mr. Wm. Watson, formerly manager of the South Rose Deep, is now in charge of the Robinson Deep, at Johannesburg.

Mr. R. E. Warriner, formerly at the Bonanza, has been appointed manager of the French Rand mines, at Johannesburg.

Mr. Carl Schiffner, professor of metallurgy at the Bergakademie, Freiberg, is visiting the smelting centers of this country.

Mr. H. W. Turner, of San Francisco, will take charge of the Marfa & Mariposa quicksilver mine at Terlingua, Texas.

Messrs. W. W. Ellis and H. T. Reno have established themselves as a firm of mining engineers at 839 Equitable Building, Denver.

Dr. Schuyler Skaats Wheeler, president of the Crocker-Wheeler Co., sailed for Europe July 15, with Mrs. Wheeler, on the *Baltic*.

Mr. H. E. Stagg has resigned as general manager of the Bagdad-Chase Gold Mining Co., Ludlow district, San Bernardino county, California.

Mr. F. L. Ransome, of the United States Geological Survey, is now engaged in the geologic examination of the Coeur d'Alene region, in Idaho.

Mr. I. C. Boss has closed his New York office temporarily and gone to Goldfields, Nev., to superintend the construction of a mill for the Combination mines.

Mr. Yoshitaro Watanabe, professor of metallurgy in the College of Engineering, Imperial University, Tokyo, Japan, is visiting the mining regions of this country.

Mr. W. F. Warden, president and general manager of the Burt Manufacturing Co., of Akron, O., has returned from an extended business and pleasure trip to Europe.

Mr. E. P. Dargin, from Tepic, Mexico, passed through Denver a few days ago, on his way to New York, via St. Louis, and will return to Mexico in about 60 days.

Mr. James Drummond, of Searchlight, Nev., has gone to Ashanti, on the west coast of Africa, where he has accepted a position as superintendent for an English syndicate.

Mr. Arthur R. Turney, from London, passed through Denver last week on his way to British Columbia. He will shortly return to London and expects to leave there before long for South Africa.

Mr. Alexander H. Smith has returned from Toronto, Canada, to Mexico, and is now superintendent of the Los Reyes Gold Mining & Milling Co., at San Miguel Peras, Oaxaca, Mexico.

Mr. T. A. Rickard, editor of the ENGINEERING AND MINING JOURNAL, leaves New York for Houghton, Mich., on July 23. He expects to visit the copper mines of the Keweenaw peninsula.

Mr. Thos. R. Stockett, who has been acting general manager of the Crow's Nest Pass Coal Co., at Fernie, B. C., has resigned, in order to become general manager of the Western Fuel Co., of Nanaimo, B. C.

Mr. A. E. Salazar, of Santiago, Chile, professor of engineering in the National University of Chile, has been in San Francisco, Cal. He has inspected the engineering departments of several American universities.

Mr. T. H. Oxnam, Jr., assistant mine superintendent, and Mr. W. T. MacDonald, mill superintendent, are visiting the St. Louis Exposition from the Palmarejo and Mexican mines at Chinipas, Chihuahua, Mexico.

Mr. C. M. Becker, formerly assistant manager of the Smuggler-Union mine, at Telluride, Colo., is now manager of the Stratton's Independence, Ltd., at Victor, Colo. Mr. W. W. Trevall has been appointed assistant manager.

Mr. J. Piper, who had charge of developments at the Mitchell mines in the Huachuca mountains, near Bisbee, Ariz., recently resigned to become superintendent of the Hartford iron mine at Ishpeming, Mich., one of the properties of the Oliver Iron Mining Company.

OBITUARY.

Joseph P. Woodhare, a pioneer miner of Colorado, died at Denver, July 7, aged 66 years.

Charles B. Scott, who died recently at Plainfield, N. J., was a graduate of Rutgers College and of the University of Michigan, and was for a time connected with the Geological Survey of New Jersey.

INDUSTRIAL.

The Burt Manufacturing Co., of Akron, O., recently secured an order for 150 oil filters and exhaust heads from its Bristol, Eng., agents. This is said to be the largest single order ever given for goods of this kind.

Witherbee, Sherman & Co., of Port Henry, N. Y., have made additional contracts for shipping high phosphorus low bed magnetite to Antwerp, Belgium. The total amount thus far sold is from 12,000 to 13,000 tons.

The Brown-Corliss Engine Co., of Corliss, Wis., has opened a department for building high-speed engines and is now working on two units of 150-h. p.; three 250-h. p.; two 50-h. p. and one 75-h. p., all to be direct connected.

The Builders' Iron Foundry, of Providence, R. I., announces that its shops will be closed from Aug. 20 to 29 inclusive, for stock taking and general repairing. The office will be open for business, and orders for catalogue goods from stock will be filled as usual.

Arthur Koppel, manufacturer of industrial, narrow and standard gauge railway materials, of 66-68 Broad street, New York, has an exhibition of track, switches, turn-tables, cars of various styles, etc., in the Building of Mining and Metallurgy, where visitors will be welcomed.

The Reading Iron Co., of Reading, Pa., has recently purchased two new vertical, long-crosshead blowing engines of the Allis-Chalmers Co.'s Scranton works. The engines have cylinders of 44 to 84 in. diameter and 60 in. stroke. The Jones & Laughlin Steel Co. has purchased a style F Gates crusher from the Allis-Chalmers Co., as has the West Virginia Malleable Iron Co.

At the annual meeting of stockholders of the Iroquois Iron Co., of Chicago, the following board of directors was re-elected: M. Cochrane Armour, William A. Rogers, David B. Gamble, Archer Brown, George A. Tripp, Charles B. Shedd, Samuel A. Kennedy. The following officers were chosen: President, M. Cochrane Armour; vice-president, William A. Rogers, secretary and treasurer, George A. Tripp. The semi-annual dividend of 5% was declared.

The Monongahela Manufacturing Co., of Monongahela, Pa., is preparing to manufacture steel mine fans under patents secured by Charles Kuderer, who is associated with the company. The fans will be made in sizes from 4 to 25 ft. in diameter and the 20-ft. fans will have a capacity of 400,000 cubic ft. of air per minute at 3.7 in water gauge.

In a circular the Southern Railway states that it has just completed extensive improvements to its line from Louisville to St. Louis, by which it opens a direct route to the World's Fair City from the East. This work has cost several million dollars, and the line now compares with any in the country. Leaving New York on the Pennsylvania, connection is made at Washington over the Chesapeake & Ohio, which runs through historic and picturesque Virginia and through the heart of the Blue Grass Section of Kentucky. This line connects with the Southern at Louisville, and the train is fast enough to insure comfort and give satisfaction. The variable route tours offered to the World's Fair enables every one to go or return over this great railway system.

The Cosmopolitan Coal & Coke Co., of Pittsburg, has been incorporated under the laws of West Virginia with a capital of $1,000,000. The company owns 9,617 acres of coal land in Braxton county, W. Va., and a coking plant is to be built. The incorporators are: W. H. Cochran, William Moor and B. S. Forsythe, Dawson, Pa.; B. O'Connor and R. J. Shepherd, New Haven, Pa.; P. Buffano, Connellsville, Pa.; A. K. Notts, Uniontown, Pa.; N. J. Mapel, Morgantown, W. Va., and John W. Boileau.

TRADE CATALOGUES.

The Foos Gas Engine Co,, of Springfield, O., in Circular No. 65, just issued, sets forth some points of advantage of the Foos engine.

The Automatic, Gasoline Rock Drill Co., of San Francisco, has prepared a carefully written description of Brady's bull-dog rock drill.

Steel crane motors are the subject of illustrated bulletin 32, sent out by the Northern Electrical Manufacturing Co., of Madison, Wis.

Sterne Bros. Co., of San Diego, Cal., is sending out a catalogue of its West Coast automatic gasoline engine. A price list of the different types of engines is included.

The Nissen Engineering Co., of Los Angeles, Cal., issues a circular describing the Nissen circular independent stamp motor. It includes testimonials from users of this motor.

'Health is Wealth' is the title of a little brochure prepared by the International Garbage Crematory Co., of Buffalo, N. Y., and designed to describe the incinerators which it manufactures.

The Atmospheric Condensation Co., of Kansas City, Mo., has prepared a little folder entitled 'Atmospheric Condensation.' In it are described several condensing plants that are in successful operation.

Air compressors of various types are described and illustrated in bulletin No. 350, sent out by the National Electric Co., of Milwaukee. Most of the space is given to stationary and portable motor-driven compressors.

The Wonham and Mayor Engineering Works, of New York City, has issued a handsome catalogue, giving useful information regarding the equipment of industrial railways for mines, metallurgical plants and other industries.

The Joseph Dixon Crucible Co., of Jersey City, N. J., in a tasteful little booklet makes some observations on leather belting, with especial reference to Dixon's traction belt dressing and leather preservative.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

(*From Our Special Correspondent.*)

Saginaw Development Co.—The new shaft of this company, holding an option on the World's Fair and Mulheim claims, is down 160 ft. and going down about 15 ft. per week. The shaft has been in conglomerate since 70 ft. from surface, but the management expects to get into limestone within a few feet. On Junction, the property next east, the conglomerate has a steep dip. In the old workings the shaft cut a narrow limestone belt that dipped sharply to the southeast, and it was on the contact of this, 20 to 25 ft. wide, that ore was concentrated. In the new workings the company hopes to reach this limestone about 300 ft. down.

GILA COUNTY.

Buckeye Mining & Milling Co.—Operations have begun in this company's mines, near Bowie. The company proposes to do considerable development before enlarging the mill. Geo. S. Andrus is supervising engineer.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—The production of the mines at Clifton for June was 1,148 short tons of copper. The results for the half-year to March 31, 1904, show profits, including £14,863 brought forward from September 30, 1903, of £163,580. The dividends for the half-year on the A preference shares and the 7% preference stock amount to £12,266, leaving the sum of £151,314. The directors have resolved to pay, on July 27, an interim dividend on the preferred ordinary and deferred ordinary shares, absorbing £107,-659. This will leave a balance of £43,655, from which will fall to be deducted a sum to be set aside for the redemption of debt and contingencies.

Shannon.—At this copper mine, near Clifton, from Feb. 1 to June 1, 144,717 tons of ore were shipped which, it is said, averaged 5 per cent copper.

PINAL COUNTY.

Fletcher Mining, Milling & Smelting Co.—This company has purchased the Arthur ranch, near Florence. It is reported that a reduction plant will be built, and a model town laid out.

YAVAPAI COUNTY.

Pfau Gold Mining & Reduction Co.—A 100-ton cyanide plant, and a complete compressor plant are to be installed at this company's mine at Cherry.

Sunset Peak.—A large deposit of almost pure sulphur is reported at this place near Prescott.

CALIFORNIA.

BUTTE COUNTY.

Sky High.—This mine, in the upper end of the county, recently discovered by Gordon Graham, John West and Geo. Braden, is producing considerable gold. It is a gravel property.

CALAVERAS COUNTY.

Gwin Mine Development Co.—At this property, F. F. Thomas, manager, much top work has lately been done. The 80 stamps are dropping on satisfactory ore.

Midwinter.—This mine, at Felix, owned by Board Bros., is showing very rich ore. A pocket worth several thousand dollars has been uncovered.

Sentinel.—At this mine, Washington Ranch, the miners are sinking, with indications of good ore ahead.

Summit View.—At this mine, near Hodson, miners are taking out good ore. A new compressor has been delivered, and also a new hoisting engine. Contracts have been let for a 10-stamp mill.

DEL NORTE COUNTY.

Cottage Grove Mining Co.—This company has been organized, with headquarters at Arcata, to mine in the Smith river section where it owns some undeveloped claims. The directors are J. S. Seeley, D. D. Averill, M. Greenwald, S. J. Titlow, B. L. Waite, H. S. Seeley and E. Beaulieu, all of Arcata.

Monumental.—At these mines work is progressing. A shaft is being sunk south of the present one, to tap the main ledge.

EL DORADO COUNTY.

Eagle.—Boston men owning this mine at Grizzly Flat are examining this property, and may start it up. The mine has a record as a producer years ago.

Ida Mitchell.—Some fine looking ore is being taken from this mine. A. M. McDonald is superintendent.

Texas Hill.—The mill, boarding house, blacksmith shop, etc., have been completed and the mill will be running in a few weeks.

INYO COUNTY.

World Beater.—In this mine at Ballarat a large body of high-grade ore has been opened by a drift from No. 2 tunnel. The mill is paying all expenses, including dead work.

KERN COUNTY.

King Solomon.—The owners of this mine near Havilah have struck a 2-ft. ledge of fair-grade ore.

Merced.—This company, operating near Randsburg, has let a contract for 80 ft. more of shaft.

MONO COUNTY.

Masonic Mountain.—Numbers of locations are being made in this new camp. The Pittsburg shaft shows a 5-ft. ledge of first class ore. The Rough & Ready, adjoining, has also some excellent rock. Good rock has been found on the claims owned by A. Seiler, of Bodie.

PLACER COUNTY.

Dairy Farm.—This property is soon to have a railroad connected with the main line. The ore is shipped to smelters and is hauled by team to the railroad. A large amount of money has been spent in development.

Newcastle District.—At this place the Hathaway, A. B. Eastwood, manager, will resume work soon. The Gold Blossom has 6 air drills and will soon employ 60 men. This district is in a rich fruit and orchard region.

PLUMAS COUNTY.

Gold Run.—In this hydraulic mine near Quincy, C. A. Poage, manager, the quartz ledge discovered is 8 to 18 ft. wide and shows free gold. The ledge is said to be traceable for 300 ft.

Jamison Mining Co.—This mine, S. W. Cheyney, manager, is employing about 50 men and running the mill steadily.

Keystone.—This mine at Sierra City, is being developed, and the management is preparing to put up a 10-stamp mill.

SAN BERNARDINO COUNTY.

Lytle Creek Canyon.—When the Edison Electric Co. turns the waters of the creek into its pipe line free access to the bed of the creek will be had and many claims will be tested. Los Angeles men have leased the old Cox & Van Lorin claim and will begin work at once.

SANTA CLARA COUNTY.

San Juan.—Development work on this quicksilver claim near Oak Hill is to be pushed by R. B. Harper, manager. The old shaft has been cleaned out and some good ore found. There is a 24-pipe retort at the mine and a new furnace is to be erected.

SHASTA COUNTY.

Dredging Ground.—On Cottonwood creek, W. R. Hazlewood has been prospecting on the middle fork. D. S. Cone has turned over the bond on 1,050 acres near Gas Point to C. Y. De Lay, who will shortly begin prospecting. Some 1,500 acres adjoining the De Lay tract, 4 miles from Gas Point, are reported controlled by W. P. Hammon, of Oroville. The three properties named cover about 8 miles of creek bed and bottom land.

SISKIYOU COUNTY.

Blue Ledge.—The new owners have begun work, intending to put the mines in a productive stage as soon as possible.

Classic Hill.—This property, 14 miles from Happy Camp, has been sold to the Ricoro Mining Co., of Los Angeles. C. G. Mullins, for the company, is preparing to work the property.

Ethel Lynn Mining Co.—Tnis company has been organized to work the Horse Creek placer in Oak Bar district. Wm. Bell, superintendent, will put 35 men at work immediately. The ground is shallow and has never been touched, and was lately sold to the company by H. J. Barton, P. C. Lange and Maurice Renner.

Headwater Mining Co.—One of the ledges on this property on the North Fork of Humbug, is yielding considerable quartz carrying pyrites, and is being shipped to the smelters at Keswick.

Mono.—This mine, also known as the Punch Creek, was owned by Geo. W. Grayson, of San Francisco, who sold some months ago to men who have now sold to Easterners, at a profit.

TRINITY COUNTY.

Mason & Thayer.—At this mine, Dedrick, Superintendent Joyce expects to have a new mill this fall.

Yellow Rose.—The ledge in the lower level has been opened for 100 ft., but the width is undetermined. There are several hundred tons of good ore on the dump. Geo. Cary is managing owner.

TULARE COUNTY.

Minnie Ellen.—This quartz mine in the San Joaquin valley, a short distance from Porterville, is owned by the Yellow King Mining Co., of Fresno. Los Angeles men are examining the property.

TUOLUMNE COUNTY.

Bonded.—J. L. Halck has bonded to Fritz Wolff the Surprise, Laurel and Morning Star mines, west of Sonora, for $10,000.

Clio.—It is reported that a strong company has acquired this mine near Jacksonville.

Doyle Ranch.—The mill at this mine is being put in order, and work on the hoist is going ahead.

Free Lance.—Geo. Bartlett has sold to W. J. Wilson a half interest in this mine, and has given a bond for the other half interest. A bond

for the whole has been given to Jeffries Bros., of San Francisco, who are to develop the property.

COLORADO.

GILPIN COUNTY.

(From Our Special Correspondent.)

Freight Rates.—The Colorado & Southern road has granted a cut in freight rates, on and after July 15, on fresh concentrates and tailings from this county. The former rates were $1 per ton on ores and concentrates carrying values up to $10 per ton, and $1.50 per ton for all carrying values from $10 to $30 per ton. The new rates are 75c. per ton on ores carrying values up to $9 per ton and $1 per ton on all carrying values from $9 to $20 per ton.

Caledonia.—John Powers and others, of Black Hawk, have taken a lease on the 20-stamp mill at this mine at Wide Awake, and have started it up on ores from the Stewart mine in Hawkeye district.

Cook-Fisk and Gregory-Bobtail Consolidation.—An order has been placed with the Rand Drill Co. for an imperial 20-drill air compressor, to be installed at this company's property. O. B. Thompson is manager.

East Boston.—A 70-h. p. boiler is to be installed at this mine.

Nashville and John L.—A lease and bond on these properties in Russell district has been assigned to Joseph Boyd, of Idaho Springs. Denver men are the owners, and some good pay ores have been opened up. A plant of machinery and buildings has been recently put in on the Nashville.

Nemeha.—This group of three claims on Bobtail hill has been taken up by Chicago parties under a lease and option. Arrangements are being made for starting work during the next 30 days. E. S. Moulton, of Central City, is owner.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Rock Hill.—The Colorado Midland has decided to run a spur from its main branch at the head of California gulch to the different shipping mines of this section. The surveys are now being made. Prospecting has been started with the diamond drill on the western edge of this hill, opposite the Arkansas smelter.

Small Hopes.—This property is worked by lessees; from the North shaft and the Blaine 200 tons a month of fair grade carbonates are shipped, and from the Result 200 tons of oxidized iron, while the old Emmet produces 500 tons of lead sulphides monthly.

Vega.—Sinking will start on this property in the near future. The property belongs to the Diamond Co., and as the ore in that property is dipping into the Vega territory it was deemed best by the company to abandon the Diamond and work the ground through the Vega.

Wallace.—This mine, below the Big Chief, is shipping a fair grade of iron from the upper workings. Development work is being pushed below in new ground.

Welsh Shaft.—A new plant of machinery has been installed and sinking started at this mine.

Wood Fraction.—Shipments are leaving this property steadily. Work is being pushed to ascertain the extent of the ore body.

Wood.—Some rich silver ore has been found at this mine recently. It is worked from the Bon Air and the ore runs from 400 to 1,000 oz. per ton and is heavily covered with chlorides. Beside the ore body is a large deposit of ochre that runs well in silver.

SAN MIGUEL COUNTY.

(From Our Special Correspondent.)

Gold King Consolidated Mining Co.—This company's 40-stamp mill, in Gold King basin, is running almost full capacity on ore mined by lessees in the Gold King mine. In a few weeks it will treat ore from the Summit, above the King, on which a small force is working under the direction of L. L. Nunn, of Telluride, who recently secured a lease and option. By handling the ore through the Gold King workings, it is thought the Summit will develop into one of the most profitable mines in the district.

Hattie.—A strike of rich gold ore has been recently made on this property in Chapman gulch, above the Ophir, near the head of Bear creek. The claim is little more than a prospect, but the vein has been opened at four or five different places in a distance of about 3,000 ft. Some of the ore is worth from $1 to $5 a pound, and it is estimated that the owners, J. M. Belisle, of Ophir, and J. R. McCaskey, of Telluride, are taking out from $15,000 to $20,000 per month. The lower grade mineral is packed to the Suffolk-Globe 40-stamp mill at Ophir.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Labor Situation.—Conditions in the district are quiet and mining is progressing as usual. The pay-day disbursements this month were not as large as usual, owing to the shut-down in June when the station at Independence was blown up.

Elkton Consolidated Gold Mining Co.—At the annual meeting the old directors were re-elected, as follows: E. P. Shove, E. M. De La Vergne, J. W. Graham, Sherwood Aldrich, M. F. Stark, and J. C. Cooper. The official reports show the affairs of the company in splendid shape. At present the company has on hand in cash and ore about $40,000. The showing in the eighth level, recently drained, is especially good. All the indebtedness has been paid. J. W. Graham is president of the company, E. M. De La Vergne vice-president and general manager, and Sherwood Aldrich secretary and treasurer. Messrs. Aldrich, De La Vergne and Graham comprise the executive committee.

Stratton's Independence, Ltd.—A large number of applications for leases have been made, but so far only a few have been granted. It is understood that a large number will be let, giving employment to many men.

Theresa.—This company is suing the Golden Cycle, claiming that large amounts of ore have been taken from the Cycle grounds from veins apexing in Theresa territory.

Victor Gold Mining Co.—A shipment of ore has been made since this property started up recently. It had been idle several years except for a few lessees, though it has produced a large amount of ore. Fred Bodfish, of Victor, is in charge.

IDAHO.

LEMHI COUNTY.

Grey Cliff Mining & Milling Co.—This company is to resume work on its property at the head of Geerston creek.

Italian.—This mine on Arnett creek is putting up a concentrator.

OWYHEE COUNTY.

Dewey Consolidated Mining & Smelting Company.—This company has bought a 100-ton cyanide plant from the Allis-Chalmers Co.

SHOSHONE COUNTY.

Copper King.—Good ore is reported struck at this mine between Burke and Mullan.

Mammoth.—At the No. 6 tunnel at this mine, at Mace, an addition is being built to the ore bins, which will double their capacity.

Mineral Farm.—The lower tunnel on this group at Wallace, has been driven 700 ft. A well-defined ledge carrying a small quantity of carbonate has been struck and explored.

Wake-Up Mining Co.—This company has purchased the group of claims known as the Ward property, on the summit betwen Delta and Murray, from Thomas Shuster, J. A. Ward, A. B. Ward and S. W. Ward for a reported price of $50,000. The group consists of 11 claims, and $25,000 has been expended on development work.

Waterbury Metal Extraction Co.—This company has ordered from Denver a plant for leaching copper ores at a reported cost of $60,000. The plant will be erected at Larson's spur, a short distance east of Mullan, and will treat ores from the Snowstorm mine.

WASHINGTON COUNTY.

Thunder Mountain Gold Reef Co.—A 5-stamp mill will be installed at the Confidence mine at Weiser.

ILLINOIS.

SANGAMON COUNTY.

(From Our Special Correspondent.)

Springfield Colliery Co.—This company has been organized to mine about 1,000 acres of coal recently purchased along the Illinois Central and Wabash railroads, northeast of Springfield about four miles. The capital stock is $150,000, subscribed as follows: J. S. Jones and H. C. Adams, Chicago, and C. F. Evans, Columbus, O., $45,000 each, and D. W. Heath, Chicago, and Edward H. Coxe and J. L. Dickerson, of Springfield, $5,000 each.

INDIANA.

(From Our Special Correspondent.)

Indiana Coal Area.—The coal area of Indiana embraces 14,000 square miles, or considerably more than one-third of the State, according to field surveys just completed by State Geologist Blatchley, who is now preparing a map showing the extent and boundaries of the coal-field. Mr. Blatchley says that while there are many persons living who can remember when not a bushel of coal was mined in the State, last year the output was 9,400,000 tons. The production increases steadily, and at the present rate the supply will last 200 years.

GREENE COUNTY.

(From Our Special Correspondent.)

Lyons Coal Mining Co.—This company has incorporated with a capital stock of $15,000; it will sink shafts and mine coal near Lyons. William Kales, B. F. Winters and O. E. Tansey are the incorporators.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Osceola Consolidated.—Captain Hugh James, with the Calumet & Hecla Mining Co., for 30 years, has been appointed head mining captain of this property, succeeding Captain Thomas Edwards, who resigned several months ago.

Quincy.—The product for June was 1,163 tons of mineral.

Tamarack.—This mine produced 537½ tons of refined copper, it is estimated, in June. Repairs to No. 2 shaft will be completed in six weeks. Two sets of timbers are being put in.

Trimountain.—The June production was 760 tons of mineral. The rock stamped is averaging 20 lb. refined copper per ton.

Winona.—Charles E. Adams, treasurer of this company, has returned to Boston after examining the mine. The June output was 28 tons of mineral.

Wolverine.—At this mine 25 drills are in commission and rock shipments average 27,500 tons per month. The lowest openings show good copper-bearing ground. The rock stamped averages 29 lb. of refined coper per ton. The mine reports an output of 522 4-5 tons of mineral for June. The smelting contract with the Lake Superior Smelting Co. has expired, and all mineral is now sent .o the Michigan Smelting Co.'s plant for treatment.

MINNESOTA.

IRON—MESABI RANGE.

On the eastern Mesabi underground mines shipping from stock include the Genoa, Malta, Elba, La Belle, Franklin and Bessemer. These mines are also shipping their daily hoist. Pettit and Duluth are underground mines, shipping from hoists only; Biwabik ships from open pit. Stevens, east of Biwabik, is now an important open-pit shipper, but is not sending out ore. It has never shipped, though extensive and costly work has been done. Miller, south of Stevens, will soon be shipping its daily hoist. Wills, near Elba, will not ship this year. Corsica is idle. Cass, near Biwabik, may ship later. Holland will probably do nothing this year. This list includes everything east of the villages of Eveleth and Virginia.

There are indications of a revival of exploration, on a moderate scale. Drills are wanted,

and several proposals are under consideration. The bulk of work undertaken this year will be rather inexpensive churn drilling.

The shaft on the Mulheim claim of the Worlds Fair group is now in conglomerate at 130 ft. depth, and between 30 and 36 in. daily. It is a standard 3-compartment shaft thoroughly timbered.

The claims at Pearce, just bonded for $100,000 by Geo. Maas and associates, are beginning to show activity, and machinery for sinking is going in. No railroad reaches this property, so all stuff is hauled by team up the cañon from the El Paso & Southwestern road.

IRON—VERMILION RANGE.

(*From Our Special Correspondent.*)

Section 30.—Diamond drilling has been under way since February, 1903, first under D. E. Woodbridge, of Duluth; later under G. N. Lonstorf, of Milwaukee. Part of the time four drills were at work, and later three, reduced now to two. The Lonstorf work began nearly a year ago, since then about 6,000 ft. of drilling have been done, some of it vertically and some at steep angels. Two diamond bits have been lost. Two holes are now in progress, one on Lot 6, near the center of the north side, and the second toward the southeast corner of the southeast quarter of the northwest quarter of the section. Ore has been cut in several holes, but on account of the difficulty of getting into it, little more is known as to the possibilities of a large deposit than when the former work ceased last July. That work had proved an ore body of undeterminable size, which could not be explored economically and satisfactorily by drills. From $30,000 to $40,000 has since been spent in more drilling.

White Iron Lake Iron Co.—Diamond drill exploration on the west side of White Iron lake have been going on for some months. The company has developed a considerable body of magnetite, bunchy and silicious, and much like that on the Southall mine, in section 4, T. 62, R. 13. The company seems satisfied with the showings, but the mining public is somewhat skeptical.

MISSOURI.

MORGAN COUNTY.

(*From Our Special Correspondent.*)

Morgan County Coal Co.—H. C. Adams, of Chicago, vice-president of the Jones & Adams Co.; C. J. White, of Danville, Ill., former general superintendent of the Brookside Coal Co., and Edward H. Coxe, of Springfield, Ill., general superintendent of the Jones & Adams Co., have examined the company's property on the line of the Chicago, Rock Island & Pacific Railway between St. Louis and Kansas City with the idea of forming a company to work the property.

ST. FRANCOIS COUNTY.

(*From Our Special Correspondent.*)

Catherine Lead Co.—This company has gone into the hands of a receiver.

Columbia.—The lease of this property by the Commercial Lead Co. has been allowed to lapse after a disastrous and brief career. The property is now operated on a small scale by the Columbia company.

Farmington Electric Railway.—The first section of the electric road started to run from De Lassus through Farmington to Flat river is about ready, as the cars are being received. The new company that controls it is extending the road to Flat river via Korn creek and the Missouri Southern Railroad.

St. Joe Lead Co.—This company has drilled a 6-in. hole through the bottom sandstone, to secure a pure supply of water, at Bonne Terre. The sandstone was found to be 200 ft. thick, but showed no lead. Half of the new mill at Owl creek has started; when completed it will have a daily capacity of 1,000 tons.

MONTANA.

GRANITE COUNTY.

Gold Reef.—The mill and equipment of the Mary Jane Co., at Boise, Idaho, have been purchased for this mine at Philipsburg, and will be installed at once.

LEWIS AND CLARKE COUNTY.

Bald Butte Co.—The mill has started work.

Lee Mountain Co.—This company, at Rimini, which has been reorganized, is sinking a new shaft to a depth of 500 ft.

MADISON COUNTY.

Mammoth.—The stamp mill is running 5 stamps and treating ores from the Mammoth mine. When 10 stamps are dropping the mill will treat custom ore also.

PARK COUNTY.

Kimberly-Montana Gold Mining Co.—As a result of bankruptcy proceedings in the United States Court in Helena, the mines and mills of this company at Jardine have been closed, and the property placed in the hands of T. J. Finlon, of Butte, as the receiver.

NEVADA.

STOREY COUNTY—COMSTOCK LODE.

Union.—A fire that started on July 14 in the rope house of this shaft, through which the Scorpion and Sierra Nevada mines are worked, destroyed the hoisting plant, causing a loss estimated at over $100,000, partly covered by insurance. Considerable work has been done in the Union, Scorpion and Sierra Nevada recently, and it is said that the hoisting plant will be replaced.

OREGON.

BAKER COUNTY.

Copperopolis.—A quarter interest in this copper mine in the Greenhorn district has been purchased by W. P. La Roche, Max L. Bych and Charles S. Richmond, of Savannah, Ga., and J. C. De Wolfe, of New Brunswick. The reported price is $30,000.

Oregon Free Gold Mining Co.—A rich strike is reported at this company's mine, at Lost Basin, 25 miles northeast of Baker City.

Virtue Mines & Development Co.—The contract for a large hoist and engine at the Virtue mine, Baker City, has been let.

GRANT COUNTY.

Monumental Group.—Deep development is again being carried on at this group, in the Granite district. S. W. Steffner and J. M. Hutchins, both of Chatanooga, Tenn., have secured the group for the reported consideration of $60,000.

Red Boy.—Contracts have been let for a large quantity of wood and mine timber. This is taken to signify that operations are to be resumed at an early date.

PENNSYLVANIA.

Pennsylvania Railroad Co.—Coal and coke shipments originating on the lines east of Pittsburg and Erie for the week ending July 2 and the period since January 1 were as below, in short tons:

	Week.	Jan. 1-July 2.
Anthracite	93,558	2,233,037
Bituminous	547,411	13,412,197
Coke	151,602	4,295,947
Total	792,571	19,941,181

Compared with last year there is quite a falloff all round.

ANTHRACITE COAL.

Diamond.—At this old colliery of the Delaware, Lackawanna & Western Co., at Scranton, the Tripp shaft is to be sunk to the Dunmore No. 1, 2 and 3 veins.

John Veith.—A Pottsville contractor is to sink the 1,200-ft. shafts of this new colliery of the Philadelphia & Reading Coal & Iron Co., near Phenix Park.

Philadelphia & Reading Coal & Iron Co.—It is reported that this company is about to abandon the Indian Ridge breaker at Shenandoah. The breaker is old and much out of repair. The coal from the mine will be run to the Knickerbocker and Ellangowan collieries.

West Ridge.—By the breaking of a coupling part of a trip of cars went down the shaft of this colliery near Scranton recently. Considerable damage was done the shaft and the hoisting engine.

BITUMINOUS COAL.

Altoona Coal & Coke Co.—The coal tipple of this company, at Bakers Mines, west of Altoona, was burned July 10, entailing a loss of $20,000.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Extreme Mining Co.—W. W. Wright, of Custer, general manager, states that 35 tons of ore are treated daily.

Ivanhoe Gold Mining Co.—Hoisting machinery has arrived for the shaft near Custer.

Ruberta Mining Co.—The 10-stamp mill is nearly completed. W. W. Olds, of Custer, is general manager.

Sebury-Calkins.—At the annual meeting these officers were elected: Otto Grantz, Deadwood, president; B. E. Salmon, Lead, vice-president; John Baggaley, Deadwood, secretary and treasurer.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Clover Leaf Mining Co.—The mill is running full capacity 60 stamps. The mine is making 2,000 gal. of water a minute. Preparations are being made to sink the shaft. O. B. Amsden is general manager.

Gilt Edge-Maid.—The Black Hills Light & Power Co., of Lead, has secured right of way to the Gilt Edge-Maid mill for electric power. The mill building is enclosed and the machinery is being placed.

Lexington Hill Co.—The tunnel is in 500 ft.

Midget Fraction.—Deadwood mining men have leased this fraction surrounded by the Dakota mine, and will ship to Deadwood. The ground is owned by Thomas Whittaker and others of Deadwood.

PENNINGTON COUNTY.

(*From Our Special Correspondent.*)

Black Eagle Co.—The 30-ton Huntington mill has made its first run at the mine 4 miles west of Rochford. The ore will be supplied from a 70-ft. shaft.

Bullion.—John Long, of Chicago, and associates, have an option on this mine. Work is suspended, waiting for an air compressor. The cross-cut tunnel is in over 1,000 ft.

Gopher Mining Co.—A test run is being made on ore from the Galena mine at the Sunbeam mill.

Lucky Boy.—The shaft is down 300 ft. The owners will erect a mill if the values are as good as at 200 ft.

Mainstay Mining & Milling Co.—Lumber has been delivered for a cyanide annex to the 30-stamp mill. An air compressor is being installed at the mine at Keystone. T. R. Griffiths, superintendent, has gone to Denver.

Montana Mine.—Work has been resumed on the property at Nahant.

UTAH.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Ore Shipments.—Shipments for the week ending July 16 were: Ajax, 1; Bullion-Beck, 2; Carisa, 2; Centennial-Eureka, 52; Eagle and Blue Bell, 3; Gemini, 18; Grand Central, 17; Lower Mammoth, 1; Mammoth, 14; South Swansea, 1; Uncle Sam Consolidated, 1; Uncle Sam (concentrates), 3; United Sunbeam, 4; Yankee Consolidated, 7.

Centennial-Eureka.—Work is progressing vigorously on the new 1,800-level, where an extension of the ore bodies is being opened up.

Mammoth.—This property is shipping several carloads of high grade ore daily. Shipments this week brought better than $100 to the ton.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Bingham Consolidated.—The copper bullion shipments from the smelter during the week ending July 16 aggregated 248,000 lb.

Bingham & New Haven.—Surveys are completed for a new aerial tramway to connect the mine with a loading station on the Copper Belt railroad. An order for the train will be placed shortly. The company's offices are at Salt Lake City, and L. S. Stoddard is president.

Flagstaff.—This old-time producer at Alta is being examined for Eastern men. The Emma mine, adjoining it, is being examined by the same men. Both properties have been heavy shippers.

TOOELE COUNTY.

(From Our Special Correspondent.)

Consolidated Mercur.—At the annual meeting at Jersey City, N. J., the old board of directors, comprising John Dern, Ed. H. Aires, George H. Dern, William M. Thompson, W. S. McCarnick, of Salt Lake, and A. W. Chesterton, of Boston, was retained.

Consolidated Mercur.—The extraction of gold was larger during June than for about a year, leaving a surplus after paying expenses. The clean-up of auro-cyanides for the first 11 days of July exceeded $20,000.

Indianapolis.—The adit has tapped an ore body at 600 ft. in.

FOREIGN MINING NEWS.

ASIA.

INDIA—MYSORE.

Kolar Gold-field.—The gold production reported for June was 51,606 oz. bullion, an increase of 2,626 oz. over June, 1903. For the six months ending June 30 the total production was 306,830 oz. bullion, against 288,554 oz. in the first half of 1903, showing an increase of 18,276 oz. The bullion reported this year was equal to 276,147 oz. fine gold, or $5,707,958 in value.

AUSTRALIA.

QUEENSLAND.

The Mines Department reports that the output of the State in May was 60,330 oz. fine gold. This is a decrease of 5,225 oz. from May of last year.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Following are the shipments for the week ending July 9, in tons: Granby, 3,000 tons; Mother Lode, 2,880 tons; Emma, 800 tons; Oro Denoro, 90 tons; Brey Fogle, 30 tons; No. 37, 30 tons. Total for the week, 6,830 tons. Total for the year to date, 418,837 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending July 9 were as follows, in tons: Le Roi, 1,015; Centre Star, 1,500; War Eagle, 1,200; Le Roi Two, 160; Le Roi Two (Elmore), 300; Kootenay, 260; Jumbo, 350; total, 4,785; total for the year, 187,198.

NOVA SCOTIA—AMHERST COUNTY.

Fundy Coal Co., Ltd.—This company, owning properties near Amherst, is reported to contemplate improvements which will give it a production of 1,000 tons of coal daily.

ONTARIO—HASTINGS COUNTY.

(From Our Special Correspondent.)

Ontario Mining & Smelting Co.—This company at Bannockburn, has its concentrates running double shift. The plant was expected to be running last fall, but owing to delays in getting machinery, and the winter weather the work was considerably delayed. Sinking in the main shaft is progressing favorably, and god ore continues with depth. A blast furnace is about ready to blow in. H. S. E. Gamm, of New Yo.k, is manager and superintendent.

Sovereign.—This mine has begun operating the stamp mill, which has been thoroughly overhauled.

MINING STOCKS.

(Full quotations given on pages 126 and 127.)

New York, July 20.

A slightly better feeling prevails, and for a short time the market showed strength, but at the close is again quiet. Amalgamated Copper did a larger business, rising from $51.50 to $54.25, and Anaconda from $18.375 to $19. Green Consolidated, of Mexico, made sales at $15.50, $15.25, and British Columbia at $2.50@$2.375.

As a sequel to the speculation in Phoenix of Arizona the New York Stock Exchange has dropped it from the unlisted department without comment. The latest sales have been on a basis of 25@27c. per share. The company is capitalized at $750,000 each of common and preferred stock, but only $401,000 of the common was listed, although application had been made to add the remainder.

Ontario Silver, of Utah, is weak, a sale being made at $3.85. In the Comstock list the shares are uninterestingly quiet, witnessing another call of assessments. Consolidated California & Virginia brought $1.15. The Colorado stocks attracted little attention.

Boston. July 19.

(From Our Special Correspondent.)

There has been the heaviest trading seen in this market for almost a year, and the activity is in the copper shares. Since the advertisement of Thomas Lawson a week ago, Copper Range has moved up from $45 to $57, at which price it closed. The trading in this stock has been particularly heavy, the sales for the week footing up 60,300 shares, or an average of 10,000 shares per day. The momentum has been great, and a broad, active market is on in copper shares. The street has been awaiting this for a long time, and although Lawson has been severely criticised in the past, he is still the Moses of the situation. Reactions have been slight, and the activity has gone from one stock to another with rapidity.

To-day United States Mining was taken in hand, and on trading of 10,400 shares rose $1.50 to $23.12½. The closing a week ago was $21.50. Bingham has also been something of a feature, having made a gain of $1.25 for the week, closing at $26.37½. Utah has acted as if certain interests were trying to hold the price down, although it has gone up $1 to $38.25.

Lawson's Trinity has been a marked feature and, with more or less manipulation, has recorded a $2.25 advance for the week, touching $7.75. This stock is up over 100% from its low price of the year. Centennial has bulled hard, varying from $24 to $25.37½, closing a fraction above last week at the latter price. Daly-West has again suffered in price by mysterious selling of long stock, said to be largely from inside sources. It touched $14.50 to-day, with recovery to $17.25 at the close, against $22 a week ago.

Santa Fe mining was active for a day or two and touched $2.50, but considerable stock was met at this level and the activity soon subsided. Adventure mining is off to $1 on knowledge that an assessment has got to be levied to carry on development work. Isle Royale took on a lease of life last week and rose $3.50 to $11.50, but has since quieted down, and closed at $10.75. Old Dominion is up less than $1 to $14.25. Osceola sold at $64@$62, closing at the latter, and Mohawk has varied from $43.25 to $44.75.

The cheaper stocks have shown activity, but at present the activity is given over to the second grade of securities. Sales of St. Mary's Mineral Land have been made at $43@$44. Boston Consolidated has sold on the outside market at from $5.50 to $5.87½. Shannon Copper has gained a small fraction, touching $6 to-day. This company will retire $60,000 bonds August 1, leaving $480,000 outstanding.

Colorado Springs. July 15.

(From Our Special Correspondent.)

While trading has been livelier as a whole, and some stocks especially active, the prices of Cripple Creek shares have not changed much from last week. Some have advanced a fraction and as many others show a slight decline.

Announcement comes that C. K. & N. will pay another dividend of $14,000, which makes a total of $143,190 which this company has thus far distributed, representing about 10c. per share. Not long ago this stock was selling for about that figure. Their profits come from royalties alone..

The Portland mill near this city, which treats ore from the Portland mine, will resume operations next Monday. This has been closed since the Independence explosion, and the subsequent shutting down of the Portland mine. They now have a large supply of ore.

Portland was quoted to-day at $1.52@$1.60. Elkton sold for 63½c. El Paso brought 87 a gain of 1½c. over last week, while Elkton's quotation shows a decline of about 3c. C. K. & N. shows an increase of about 1c. over one week ago, at 33@33½c. Vindicator is quoted 66@85, with no sales.

Salt Lake City. July 16.

(From Our Special Correspondent.)

The total sales of the past week on the Salt Lake Stock & Mining Exchange brought only $29,961. The feature of the week was the drop of $4.60 a share in Daly-West. The stock displayed signs of breaking early in the week when messages from Boston brought the information that large blocks were being offered there. This started numerous rumors, and scared a number of local holders into selling on a market without support. The mine made about $7,000 after deducting expenses and the dividends of $72,000 during the month of June. Century has dropped a few cents without any apparent cause, except the limited demand. Consolidated Mercur ended the week lower, notwithstanding the assurance from the management that the mine is again making money after some trying experiences. Daly-Judge was little sought and only a few shares changed hands. Large quantities of Sacramento were offered—altogether 22,000 shares—and the price sank. May Day made the heaviest transfers of the week, and notwithstanding this the price has remained strong.

San Francisco. July 20.

(From Our Special Correspondent.)

Business for the week has been very dull, so far as the Comstocks are concerned. Trading was confined to small transactions and quick terms—a regular chipper's market. All stocks were rather weak. Ophir sold at $2.55@$2.60; Consolidated California & Virginia, $1.15; Mexican, $1.20; Sierra Nevada, 35c.; Yellow Jacket, 20c.; Chollar, 18c. per share.

On the San Francisco & Tonopah exchange, on the other hand, there was a good deal of activity, and prices were strong, under rather liberal buying. Montana Tonopah brought $2.55; Tonopah Belmont, 83c.; Tonopah Midway, 58c.; MacNamara, 55c.; Red Top, 17c.; Rescue, 12c. per share.

On the California exchange business in oil stocks was rather quiet. The Home declared a dividend of 2½c. per share, payable July 20, and that helped the price somewhat. Home sold at $1.40; Four Oil, 65c.; Oil City, 60c.; Independence, 25c. per share.

Sales of shares on the California exchange for the six months ending with June were as follows:

	Shares.	Value.
January	84,507	$31,389
February	96,677	45,556
March	194,630	126,559
April	186,035	82,664
May	202,101	100,471
June	47,498	25,303
Total	811,448	$411,942

It will be seen that the June sales were the lightest of any month for the year so far.

Monterey. July 13.

(From Our Special Correspondent.)

Exchange on New York has been raised from 214 to 215.5.

In mining stocks, Victoria, of El Oro, brought $37.50; Rosario, $32; Aldebaran, $62; Borda Antigua, $21; Dos Estrellas, $2,000, and Aurora, $10. In San Luis Potosi, Barreno sold at $72, and La Paz, $175, and Reina, of Pachuca, brought $8; Angustias, of Pozos, Guanajuato, $42, and Norias, of Bajan, Chihuahua, $700.

COAL TRADE REVIEW.

New York, July 20.

ANTHRACITE.

Conditions in the anthracite coal trade have changed but little during the week, and there is nothing in sight to indicate any material improvement in demand immediately; business will rather be quieter during the next few weeks, the normal dull season in the trade. The tonnage going from the mines is still heavy, though the July output will naturally be considerable less than the June, while that for August may be even smaller than that for July. The companies are already accommodating the operation of the mines to this decrease in demand by stopping work at different collieries for a few days at a time to make any needed repairs or alterations.

Trade in the Northwest is on a normal summer basis. A heavy tonnage is arriving at docks at the head of the lakes, but the movement to country yards is not particularly brisk. In Chicago territory the market continues dull. Receipts by lake which fell off for a few days, due to the Fourth of July holiday at the mines, are again approaching normal. Supplies are accumulating on docks, and retail demand is slack. Independent operators have not, however, sought to cut prices this year as last. There has been a local reduction in the small steam sizes, buckwheat selling for $3.25, f. o. b. cars at Chicago, and No. 2 coal, formerly called pea, at $4.80, f. o. b. cars. These prices bear no relation to eastern prices, since the coal is dock screenings, and the freight rate on buckwheat from the mines to Chicago is $3.50 per ton.

Along the lower lakes and in Canadian territory there is a very fair demand at some points, while at others the market is quiet. Along the Atlantic seaboard the weather has effected retail demand, and the market is prevailingly quiet. A fair tonnage is still moving eastward by water, as in spite of the heavy shipments during May, there are still small yards at shoal water ports that want coal. The all-rail demand continues light. In general, however, there has been no accumulation of prepared sizes. The steam sizes, as is to be expected with bituminous coal selling at present figures, continue to accumulate on producers' hands. It is altogether likely that contemplated increases of storage capacity by several companies will be largely utilized for taking care of these sizes during the months of least demand.

BITUMINOUS.

In the Atlantic seaboard bituminous trade consumers are taking rather larger proportions of coal on their monthly quotas than were expected a few weeks ago, when the general idea was that the demand for winter supplies would start in about the middle or end of August. This increase of demand is reflected by the condition at certain eastern ports, which are badly congested with vessels discharging. Some men in the trade are a little afraid of the present situation, thinking that fall demand wil not be as brisk as it should be in consequence of present buying.

Trade in the far East is taking considerable coal, and we hear of some orders held up, on account of the congested condition of certain unloading ports. Along Iong Island sound there is a healthy increase in demand. At New York harbor points busines is slack, and prices remain about the same, $2.25 for the poorer grades of Clearfield, f. o. b. New York harbor shipping port. This means 75c. at the mines, but there are reports of mine prices as low as 65c., and even 60c., with gas slack at 35c. From these low figures coal sells upward according to grade. The all-rail trade shows no material change; some producers report a few new orders.

Transportation from the mines to tidewater is up to all demands. Car supply at the mines is good, some of the main line roads permitting cars to go on foreign roads. The coastwise vessel market is weak. At Newport News and Norfolk shippers and vessel owners seem to be working together to some extent to maintain rates, the explanation being that quite a number of season charters on large craft were made from these ports, and the rates now prevailing from other ports lead to invidious comparisons. The present rate from Norfolk and Newport News is 90c. and from Baltimore, 85c. to points beyond Cape Cod, though normally the Baltimore rate should be 5c. higher rather than 5c. lower than the Norfolk and Newport News rate. The 10-day loading and discharge clause is becoming irksome to some signers of the agreement. No open break is known, but it is currently reported that some of the strongest upholders of the clause have agreed to waive it where necessary. It is thought that this clause will fall more in disrepute as present conditions continue, since, in the case of those eastern ports, where vesels are held out of a berth for two weeks or more, the charge of 6c. a day for demurrage that becomes effective after the expiration of the 10 days allowed for loading and unloading, makes a very serious item amounting to more than the freight. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island sound, 70c.; Boston, Salem and Portland, 80c.; Portsmouth, 90c.; Lynn, Newburyport and Bangor, 95c.; Bath, 85c.; Saco, $1.05 and towages; Gardiner, $1 and towages.

Birmingham. July 18.

(*From Our Special Correspondent.*)

There has been no change during the past week in the situation. The Tennessee Coal, Iron & Railroad Co. has announced its intention of placing convicts and non-union miners in the mines; already a number of convicts have been placed in Mine No. 3, at Pratt City. Notice has been given to the idle miners in the Blue Creek region, Jefferson county, to vacate the company houses. Mine No. 3 at Pratt City is considered one of the best mines in the State. It is equipped with an electrical haulage system. It is understood that the company has purchased a number of coal-cutting machines and will man these with convicts. There are indications that the union miners will declare a strike. The difference in a suspension, which has been going on for the past two weeks, and a strike, is said to be that when a suspension is on union miners and mine workers can assist in making repairs about the mines, while with a strike only pump and boiler men are permitted to work. Citizens of Pratt City held a meeting during the week and protested against the placing of convicts in the coal mines. Other companies also affected by the suspension are saying nothing, as far as can be learned. The Sloss-Sheffield Steel & Iron Co., in addition to a large surplus of coal and coke laid aside, has three or four mines operated with non-union labor and one large mine with convicts. There are 31 commercial coal operators with mines in full operation under the temporary contract, paying the same wage scale as was in force before July 1.

The Tennessee Coal, Iron & Railroad Co. has shut down a large battery of coke ovens at Pratt City. All other coke ovens continue in operation so far. The indications do not point now to an early adjustment of differences between the miners and the operators.

Chicago. July 18.

(*From Our Special Correspondent.*)

Midsummer dulness continues in the anthracite trade, the demand being light, and the attention of wholesalers at the lake ports chiefly devoted to accumulating dock stocks. The receipts by lake are not heavy enough to do much as yet toward making up the deficiency caused by the late opening of the season. Retailers share in the dulness, their trade being markedly smaller than at this time last year.

The strike in the packing industries is curtailing somewhat the market for bituminous. Illinois and Indiana run-of-mine and screenings of the better grades are used chiefly for this business. Western run-of-mine is quoted at $1.40@$1.60, and screenings bring $1.30@$1.50. Smokeless continues steady at about $3; the Hocking trade is light, but also steady, and at the same price—$3. Gas coals are weak.

The threshing trade is good in the Northwest, but falling off in the Southwest, the crop prospects not being highly favorable as yet. With the exception of coals affected by the strike in the packing industries, the market for bituminous, though dull, is freer from demoralizing conditions than it has been for a long time, the relation of supply to demand being notably better.

Cleveland. July 19.

(*From Our Special Correspondent.*)

The coal situation has hardly changed in any respect. Prices are about at rock bottom; they have been established on a basis where the producer just about gets his money back. The market seems to be holding steady, however. Last week sales of ¾-in. went as low as 85c. at the mine. This week the market seems to be holding steady on the basis of 90@95c. at the mine for run-of-mine. Other grades are correspondingly higher. The prices apply on both Pittsburg and Ohio coals. The slack market is holding about as it has been. There is a report around that some of the mines are willing to make contracts for slack running through the winter on the basis of 25c. This report is not credited for the reason that the Pennsylvania mines have been holding for 30c. on current business and have not made a quotation of less than 65c. on yearly contracts. The mines understand that with the lessening of the lake shipment of ¾-in. coal the slack disappears and winter prices will be higher than they are at present. The slack market, therefore, is not so weak as some of the rumors would indicate.

Coke prices are stiffening a little, but not very much. The market has held about steady on the basis of $2 for good 72-hour foundry coke and $1.50@$1.60 for good furnace coke. The whole market, however, seems to be easy, as might be supposed when midsummer conditions prevail.

The lake coal trade is not quite so gratifying. The shipment up the lakes is slower than it was supposed would be the case.

Pittsburg. July 19.

(*From Our Special Correspondent.*)

Coal.—The coal mines in the Pittsburg district continue active and shipments to lake ports are heavier than usual. There is an improvement in the local trade and prices are firmer, but run-of-mine is still quoted at $1@$1.10 at the mine. An unusually large tonnage was sent to southern ports on the rise in the rivers last week, and many tows of empty coal boats and barges were returned, insuring steady employment for the miners at the river mines for several months.

Connellsville Coke.—The coke trade has seriously suffered by the closing of the blast furnaces, and there was a heavy decrease both in production and shipments last week. Prices are lower. Standard furnace coke for third quarter shipment is quoted at $1.35, and for later delivery $1.40@$1.45 is named. Foundry coke is quoted at $1.65@$1.90. The production last week in the Connellsville region was 142,320 tons, a decrease of 10,745 tons. The shipments amounted to 5,608 cars, distributed as follows: To Pittsburg and river points, 1,948 cars; to points west of Pittsburg, 2,790 cars; to points east of Everson, 870 cars. This was a decrease of 2,515 cars compared with the shipments of the previous week.

San Francisco. July 14.

(*From Our Special Correspondent.*)

There is nothing new in the trade here, and prices are unchanged. The demand for fuel oil continues good.

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is nominal at $14 for Pennsylvania anthracite and $13 for Cumberland. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel and $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. July 20.

Negotiations are said to be pending for some large orders for foreign shipment, but nothing very definite can be learned concerning the matter.

Exports of fuel from Great Britain for the

half-year ending June 30 are reported as follows, in long tons:

	1903.	1904.		Changes.
Coal	21,724,922	22,604,579	I.	879,657
Coke	312,919	328,503	I.	15,584
Briquettes	451,462	653,586	I.	202,124
Total	22,489,303	23,586,668	I.	1,097,365

In addition to the exports given above, there were 7,890,636 tons of coal sent abroad for the use of steamers engaged in foreign trade, and 8,334,461 tons in 1904; showing an increase of 443,825 tons this year.

The shipments to the United States, included above, are reported as below, also in long tons:

	1903.	1904.		Changes.
Atlantic ports	1,031,370	25,107	D.	1,006,263
Pacific ports	50,615	61,438	I.	10,823
Total	1,081,985	86,545	D.	995,440

The trade with the United States has shrunk, this year, to its normally small proportions.

Exports of fuel from Germany for the five months ending May 31 are reported as below, in metric tons:

	1903.	1904.		Changes.
Coal	6,913,262	7,277,840	I.	364,578
Brown coal	9,656	9,073	D.	583
Coke	1,035,195	1,092,572	I.	57,377
Total	7,958,113	8,379,485	I.	421,372

The chief exports of coal were to Holland, Austria and Switzerland; of coke to France and Austria.

Imports of fuel into Germany for the five months ending May 31 were as follows, in metric tons:

	1903.	1904.		Changes.
Coal	2,449,375	2,526,818	I.	77,443
Brown coal	3,318,029	3,239,001	D.	79,028
Coke	171,030	218,515	I.	47,485
Total	5,938,434	5,984,334	I.	45,900

The largest imports of coal were from Great Britain. Practically all of the brown coal, or lignite, came from Austria.

The Southern Italian Railroad Company has contracted with Powley, Thomas & Company, at Cardiff, Wales, for 120,000 tons of Monmouthshire coal. Of this 90,000 tons are to be delivered at Ancona and Venice, and 30,000 tons at Brindisi and Leghorn. The contract price is $4.40 per ton, delivered, which, after deducting freight, makes the price, f. o. b. Cardiff, about $2.96 per ton.

Messrs. Hull, Blyth & Co., of London and Cardiff, report, under date of July 9, that Monmouthshire qualities and best Cardiff smalls are a shade stronger; other descriptions remain weak. Quotations are: Best Welch steam coal, $378; seconds, $3.60; thirds, $3.42; dry coals, $3.48; best Monmouthshire, $3.42; seconds, $3.36; best small steam coal, $1.98; seconds, $1.86; other sorts, $1.62.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

Freights to the Mediterranean ports are a little firmer. In other respects there is no change. Some rates quoted from Cardiff are: Marseilles, $1.25; Genoa, $1.26; Naples, $1.23; Las Palmas, $1.38; St. Vincent, $1.50; Rio, $2.04; Santos, $2.46; Buenos Aires, $1.80.

IRON TRADE REVIEW.

New York, July 20.

Here and there, there are evidences of a little better feeling in the iron trade; nevertheless, it must be admitted that this is not shown in actual business done. Pig iron continues to be weak, notwithstanding a slight improvement in southern, the Alabama furnacemen holding out for a basis of $9.50 for No. 2 foundry.

In finished material prices continue weak, and sales are mainly for short delivery and on a small scale. The bar market is rather demoralized. Smaller mills are readily shading prices on good orders for all classes of finished steel, and just now are getting most of the business. About the only manifestation looking towards improvement is that sellers have refused to make contracts on the basis of present prices for business running into 1905, although some producers are inclined to make offers for such trade.

So far as can be ascertained, the starting up of several large mills in the Pittsburg district has been done more for effect upon the market than because actual business demands it. A good deal of flourish has been made about this starting, which strengthens the impression that it is mainly done by way of encouraging outsiders.

Pig Iron Production.—The reports collected from the blast furnaces on July 1 show that on that date there were in operation plants having a weekly capacity of 272,300 tons, against 336,200 tons, which was the capacity of the active furnaces on June 1. This statement does not include the charcoal furnaces. The estimate made by the *Iron Age*, which is usually rather conservative, puts the total production of the anthracite and coke furnaces in June at 1,292,000 tons; for the half-year ending with June, 7,956,400 tons. To this are to be added about 200,000 tons for charcoal iron, making a total of 8,156,400 tons. The actual output for the first half of 1903 was 9,707,367 tons, showing a decrease this year of 1,550,967 tons, or 16 per cent. Of the production this year, 4,863,000 tons, or close to 60% of the total, were made by furnaces owned by the large steel companies.

Unsold stocks of pig iron owned by the merchant furnace operators are estimated at 621,000 tons on July 1. These are the largest stocks reported for several years.

British Iron Trade.—Exports of iron and steel, with manufactures thereof, from Great Britain, for the six months ending June 30, are valued by the Board of Trade returns as below:

	1903.	1904.		Changes.
Iron and steel	£15,590,383	£13,969,051	D.	£1,621,332
Manufacturers'	9,336,325	10,301,813	I.	965,488
New ships	2,305,971	2,326,056	I.	20,057
Total	£27,232,679	£26,596,920	D.	£635,759

The chief items of the iron and steel exports were, in long tons:

	1903.	1904.		Changes.
Pig iron	595,458	431,728	D.	163,730
Bars	60,437	56,249	D.	4,188
Rails	342,489	261,365	D.	81,124
Plates	85,435	74,632	D.	10,803
Sheets	177,155	193,314	I.	16,159
Tin-plates	148,297	172,134	I.	23,837
Steel ingots, etc.	70,259	58,202	D.	12,057

A considerable falling off is shown in several lines. The increase in tin-plate exports was largely to the United States, which took 26,940 tons in 1903, and 34,871 tons in 1904; an increase of 7,931 tons this year.

Imports of iron and steel for the six months were valued at £4,044,935 in 1903, and £4,136,257 in 1904; showing an increase of £91,322. The chief items of these imports were, in long tons:

	1903.	1904.		Changes.
Pig iron	67,325	62,970	I.	645
Wrought iron	88,671	56,541	D.	32,130
Steel ingots, bars, etc.	92,956	271,544	I.	178,588
Steel angles and shapes	100,228	41,115	D.	59,113
Plates	36,443	33,654	D.	2,789
Structural steel	66,879	65,830	D.	1,049

Imports of iron ore for the half-year were 3,276,688 tons in 1903, and 3,023,227 tons in 1904; showing a decrease of 253,461 tons this year. Of the ore imported 2,594,528 tons came from Spain in 1903, and 2,311,016 tons in 1904; showing a decrease of 283,512 tons, or more than the general proportion.

Birmingham. July 18.

(*From Our Special Correspondent.*)

The pig iron production is somewhat curtailed, there being six furnaces with fires banked on account of the suspension of work on the part of union coal miners. The apprehension of a further curtailment has stimulated the market, and a better inquiry is reported. There is a fairly good demand. Prices have stiffened, and $9.50 is now asked straight for No. 2 foundry iron. The Tennessee Coal, Iron & Railroad Co. has four of the Bessemer furnaces banked. The Woodward Iron Co. has two furnaces banked, but there will be an early resumption there. The big furnace of the Republic Iron & Steel Co. at Thomas has been repaired, but it will hardly be blown in until the coal mining situation clears up. The new furnace of the Lookout Mountain Iron Co. at Battello is completed, but the date of operation is not learned.

The following quotations for pig iron are given: No. 1 foundry, $9.50@$10; No. 2 foundry, $9.25@$9.50; No. 3 foundry, $8.75@$9; No. 4 foundry, $8.50@$8.75; gray forge, $8@$8.50; No. 1 soft, $9.50@$10; No. 2 soft, $8.25@$9.50.

The shipments of pig iron are showing little changes. There is no accumulation of iron, the shipments being about equal to the production. The Sloss-Sheffield Steel & Iron Co. announces that sales are a little better than production. For the month of June that company sold 18,000 tons more iron than it manufactured.

The mortgage or deed of trust securing the first consolidated mortgage 5% thirty-year gold bonds of the Alabama Consolidated Coal & Iron Co. to the amount of $3,000,000 has been filed for record in Birmingham. A fee of $5,250 for State and county record tax was paid. The mortgage is dated May 1, 1903, and the Maryland Trust Co., of Baltimore, is named as trustee.

Chicago. July 18.

(*From Our Special Correspondent.*)

The market for pig iron is bullish, in the sense that customers are demanding more iron at prevailing prices than agents for furnaces are willing to sell, showing that in the mind of the consumer prices are low. There is a demand for iron to be delivered in the first quarter of next year, but agents, as a rule, are fighting shy of such contracts. They are willing and anxious to sell for delivery in the last half of 1904, but the political and other contingencies are such as to cause them to be conservative about 1905. Meanwhile, the opinion is expressed that consumption is less than production, and until this condition is changed low prices and stagnation of the trade will continue.

Southern remains at $9@$9.25, Birmingham, or $12.65@$12.90, Chicago, for No. 2, a price which is said by agents to be too near the cost of production to make any extensive contracts for the future. Sales of southern are lighter, comparatively, than of northern iron, which brings $13.25@$13.75 for No. 2, with $13.50 about the figure for most of the business. Charcoal iron is weak at $14.50@$15.50, the demand being very small.

Coke is firm and apparently recovering from the over-supply of the last three or four weeks. Connellsville is quoted at about $4.60 on most sales, the price ranging from $5.50 to $4.75. Shipments of coke should be restricted until the market is better in tone, as large supplies sent on the indications of a rising market cause forced sales to escape demurrage charges.

Cleveland. July 19.

(*From Our Special Correspondent.*)

Iron Ore.—Buyers are still holding back, although there has been no alteration of prices, and it is beginning to look as if even the non-bessemers were on a stable basis. The market has held steady if not active. The Steel Corporation gave a more confident tone to the market during the week by the announcement that it would contract for its normal supply of ore to be brought down the lakes. The Corporation has also been chartering wild boats, indicating that the same supply of ore is likely to be brought down as was moved a year ago. This has helped the ship-owners a little, but has not materially strengthened the market, the ships being too abundant for the general situation to be affected. The market holds as it has been, wild and contract rates being made at 70c. from the head of the lakes; 65c. from Marquette, and 55c. from Escanaba.

Pig Iron.—The buyers of pig iron have been taking a little more iron for immediate use, although the situation is hardly appreciably better. Buyers are taking four months' supply on the basis of a reduced melt, and some few want to cover their needs for the last half of the year. In one or two instances the report has had it that buyers want to cover during the first quarter of next year at current prices, which producers refuse to extend beyond the first of the year. The market is steady at $11.75@$12 at the furnace for No. 2 foundry. Other grades are very dull and the market exceedingly quiet.

The sheet market has weakened. Prices have gone down to a 2c. basis for No. 27 black sheets on choice specifications, although the general market holds at about 2.10c. at the mill. Prices out of stock have not changed. The resumption of work by some of the bar iron mills has softened that market. The general quotation is now 1.30c. at the mill.

New York. July 20.

Pig Iron.—Southern irons are firmer; demand has improved slightly during the past few days, but there is no sign of any lasting increase in buying, and the market is quiet. For northern iron we quote: No. 1 X foundry, $15; No. 2 X, $14; No. 2 plain, $13.75@$14.25; gray forge, $13. For southern iron on dock, prices are about as follows: No. 1 foundry, $13.50; No. 2 foundry, $13; No. 3 foundry, $12.50.

Bar Iron and Steel.—The market is unchanged. Refined bars are quoted at 1.495c., in large lots, with steel at the same figure. Common iron bars can be had for 1.35c.

Steel Rails.—Quotations remain $28 for standard sections, f. o. b. mills. Light rails are quoted f. o. b. eastern Pennsylvania mills, as follows: 12-lb., $27; 20-lb., 25-lb., 30-lb., and 35-lb., $25; 40-lb. and 45-lb., $24.

Structural Material.—Buying is expected to improve before long, but the local situation in the building trades is not encouraging. Large lots at tide-water are still quoted nominally at 1.75@2c. for beams, angles and channels.

Philadelphia. July 20.

(*From Our Special Correspondent.*)

Pig Iron.—The office people are doing next to nothing at present, and report trade flat. Quite a number of active makers and agents are absent. There are more signs for activity in basic pig than in anything else, and some large purchases have been secretly made, concerning which the buyers refuse to say a word. The influence of Alabama iron is felt on both prices and sales. Though no business has been captured within a week by the Alabama Indians, the fear of their tomahawks keeps our people under cover. The idea prevails that all pig iron is going to sell lower, and this partly explains the fact that brokers and agents are receiving a good many inquiries. Basic is quoted at $13; gray forge at $13.25 for standard; No. 2 Alabama on dock is offered at $12.25, and No. 2 plain foundry at $13.50 delivered; No. 2 is $14.50, and No. 1 X foundry, $15@$15.50.

Steel Billets.—The outlook to-day is for some business in a large way before the month is out. Price sticks close to $24, but the business now being worked up will be done at less than that or not at all.

Bars.—The mills are doing nothing, while the stores are disposing of some iron in a retail way. Prices are at their lowest, and most mills are idle, undergoing repairs.

Scrap.—The only business done this week was in railroad scrap, which, for once in a long time, is plenty. Good stuff is selling at $12.50. Forge fire scrap is asked for and is worth from $8 to $10. Machinery scrap is scarce at $11.50 per ton.

Pittsburg. July 19.

(*From Our Special Correspondent.*)

A better feeling prevails this week in the iron and steel industry which has been greatly stimulated by the starting of a number of mills. The most important of these was the big Homestead plant of the Carnegie Steel Co., which went on in full on Sunday night. A number of the departments had been idle and others had been operated irregularly. Assurance is given that there are enough orders on the books to keep the works in steady operation for some time. The resumption of operations was made the occasion of a celebration, several hundred dollars' worth of fireworks being sent off at the entrance to the plant. The big Edgar Thomson steel works of the same company have not been idle a day this year except for repairs. The Republic Iron & Steel Co. started its bessemer steel plant and the Brown-Bonnell works at Youngstown yesterday, and is now operating over 50% of its entire capacity. The Youngstown Iron Sheet & Tube Co. started its works last week, and the plant resumed operations in full yesterday; the company has signed the Amalgamated Association scale. Every union concern in the Pittsburg district has signed and all the union works are running. The sheet plant of Zug & Co. went on in full yesterday, and the big iron plant of the Pittsburg Forge & Iron Co. was started full double-turn last Thursday. More confidence seems to have developed since the presidential candidates have been named by the leading parties, and the outlook is believed to be more encouraging than for some time past.

Despite the apparent activity in the steel market there is not much improvement in the pig iron market, but there is some, and prospects are brightening. This was indicated this week by the sale of 5,000 tons of pig iron at prices a shade above the rates that have been quoted. One interest bought 3,500 tons, which included bessemer, basic and foundry No. 2, paying $11.50 for bessemer, $11.25 for basic, and a trifle less than $11.50 for foundry, the prices named being at Valley furnaces. The deliveries extend through the second half. The gray forge sold was at the lowest point reached, being $11, Valley furnace, or $11.85, Pittsburg. Inquiries have been received during the past few days for over 15,000 tons of pig iron, and while it is probable that a few are merely feeling the market, it is likely that some will buy. It is reported that not more than 15% of the merchant furnaces are in blast, but there are unusually large stocks of iron on hand. It was said by one producer that several furnaces were closed because they had no room to store the iron. There has been an improvement in southern iron, and none is being sold in this market. Foundry No. 2 was quoted to-day at $9.50, Birmingham, an advance of 25c. over last week's price. This rate is equivalent to $13.85, Pittsburg, or over $1 a ton more than the northern product. A few furnaces, however, are still quoting $9.25, Birmingham. It was given out to-day on the most creditable authority that the lowest point in pig iron prices has been reached, and that there is certain to be an advance soon.

But little new business in steel lines is noted and prices continue low. The association mills still quote the pool price of $23 on billets, but invariably allow a rebate of $1.50 to $2 a ton on account of alleged defects. This is said to be a new way of shading prices in order to get business and still adhere to the price fixed by the association. While a rebate is allowed for defective steel, it is guaranteed to be equal to any steel made. Buyers have attempted to get black sheets of No. 28 gauge under the minimum price of 2.10c., but have failed. There has been cutting of prices in almost every finished line, but confidence is gradually being restored, and it is believed prices will be firmer now and that higher rates soon will prevail. There is not likely to be any labor disputes, as the Amalgamated Association has practically settled with all union concerns except the American Sheet & Tin-Plate Co., and another conference is scheduled for Thursday. The only difference with the big producer is on the rebate arrangement for tin-plate, and the Amalgamated conferees are likely to concede that at the coming meeting.

Pig Iron.—The market is in a little better shape than it was a week ago. Sales within the past few days aggregated 5,000 tons, and inquiries were received for over 15,000 tons. Prices are a trifle firmer for extended delivery, but low quotations continue to be made for prompt shipment. Bessemer is quoted this week at $11.50@$11.75, Valley furnace; foundry No. 2, $12.35@$12.75; Pittsburg and gray forge is lower, being quoted this week at $11.85@$12, Pittsburg.

Steel.—Some business has been done in bessemer and open-hearth billets, but the tonnage was not large. The association price of $23 was quoted, but it is understood actual sales were at a lower figure. Steel bars are still quoted at 1.35c. and plates at 1.60c., but little new business has been booked.

Sheets.—Cutting in prices has evidently been stopped, and while several orders for black sheets of No. 28 gauge have been received, none has been sold at less than 2.10c. Galvanized sheets are quoted at 3.10@3.15c.

Ferro-Manganese.—The market is quiet, and 80% domestic continues to be quoted at $41.50 per ton.

CHEMICALS AND MINERALS.

(See also Prices-Current, page 128.)

New York, July 20.

Interest is chiefly centered in the raw material markets; new sources of supply of sulphur have initiated another era for the Sicilian combination, and the final decision in fixing the fourth year's quota of exports of nitrate of soda at less than the expected consumption foretells continued high prices for this product.

Cyanide.—Imports are light, and quotations remain at 19@20c. per lb. at New York.

Bleaching Powder.—Quiet, excepting that jobbers are doing a little business at a discount. First-hands hold to $1.20@$1.25 per 100 lb. for prime brands.

Copper Sulphate.—This market is devoid of influences that may change prices, which are $4.75@$5 per 100 pounds.

Acids.—Apart from an improved demand for sulphuric acid from the soda water trade, and the possibility of higher prices for nitric acid in the near future, conditions are practically the same as reported from some weeks past.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity.

Muriatic, 18°	$1.50	Oxalic, com'l	$5.10@$5.50
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°, 1.05 bulk, ton	18.00@20.00
Nitric, 36°	4.50	Sulphuric, 66°, 1.20 bulk, ton	21.00@23.00
Nitric, 38°	4.75		
Nitric, 40°	5.00		
Nitric, 42°	5.50		

Brimstone.—Evidently the domestic producers are determined to win a strong foothold in the Eastern consuming market, for they intimate that shipments soon to arrive here aggregate over 10,000 tons. Sales of domestic sulphur are reported at $21.75, practically the same price asked for shipments of best unmixed seconds from Sicily.

Pyrites.—Generally speaking, there is a better request for contract deliveries, and prices appear to be firm, though unchanged.

We quote domestic pyrites 10@10.5c. per unit for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 10@12.5c. per unit for lump, and 9@10c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Higher prices on the coast in anticipation of inability to produce enough to meet the increasing demand has induced importers to hold 96% at $2.20 for six to 12 months' arrivals. Spot is quoted at $2.125@$2.15.

Phosphates.—There has been a change for the better in the prices for all leading grades of phosphates; that is, for foreign consumption. To some extent the firmness in ocean freight rates is responsible, but very likely the miners, experiencing such small profits last year, are playing for remunerative prices in the future. In a way dearer raw material will initiate better prices for superphosphates, a change that is sincerely hoped for by European manufacturers. Consumption continues to increase, and with judicious management of market conditions there is no reason why producers of phosphate and manufacturers of superphosphates should not share in the expected prosperity.

There is talk of 1905 contracts for Florida land pebble at 5.5@6d. per unit ($8.70@$8.40) for European delivery. An advance of $1.30 to $1.35 per ton on this grade, considering the increasing exports, must instil new hope in the land pebble industry, and incidentally give promise of better things for other producers.

Ocean freights are about as follows, per ton:

Ports.	Florida.	So. Car. Bone.	Sfax.
Baltic	$3.36@3.62	....	$2.16
Continental	3.12	.....	$1.44 $1.80@1.86
Mediterranean	3.36	$2.88 2.04	2.28
United King'm.	3.12	2.64@2.76	1.80

Charters are few, while shipowners are inclined to steady their rates.

Phosphates are quoted as follows, per ton:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla., hard rock, 77@80%	$7.25@$7.50	$10.53@11.70
land pebble, 68@73%	3.75@ 4.00	7.70@ 8.40
†Tenn., 78@80%	4.00@ 4.25	10.27@10.67
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
‡So. Car. land rock	3.25@ 3.50	.....
river rock, 55@60%	3.00@ 3.25	6.33@ 6.56
Algerian, 63@70%	....	6.93@ 7.59
58@63%	....	6.15@ 6.60
53@58%	....	5.05@ 5.20
Tunis (Gafsa)	....	6.33@ 6.50
Christmas Isle, 80@85%	....	12.87@14.11
Ocean Isle, 82@88%	....	13.60@14.45
Somme, Fr., 70@75%	....	10.63@11.02
Bordeaux, Fr., 60@65%	....	7.60@ 7.72
55@60%	....	6.44@ 6.55
Liege, Bel., 60@65%	....	7.00@ 7.10

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡ On vessel, Ashley River, S. C.

Liverpool. July 6.

(*Special Report of Joseph P. Brunner & Co.*)

The export demand for chemicals is still rather slow, but quotations are unchanged. Soda ash is quiet but steady. For tierces the nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s., net cash. Bags, 5s. per ton under price for tierces. Soda crystals are in request for home consumption, while for export a moderate trade is passing at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda receives a fair amount of attention from buyers, and prices are firm: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters. Bleaching powder is slow of sale, and there is little moving outside of deliveries on running contracts. For hardwood, £4 5s.@£4 10s. per ton, net cash, is about the nominal spot range, as to market. Chlorate of potash is firm at 2⅞d.@3d. per lb., net cash, but there is not much business reported. Bicarbonate of soda is moving off at £6 15s. per ton, less 2½% for the finest quality in 1-cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets. Sulphate of ammonia is firm at £12 3s. 9d.@£12 5s. per ton, less 2½% for good gray 24@25% in double bags, f. o. b. here. Nitrate of soda is still quoted on spot at £10 5s.@£10 10s. per ton, less 2½% for double bags f. o. b. here, as to quality, but the market is quiet.

METAL MARKET.

New York, July 20.

Gold and Silver Exports and Imports,

At all United States Ports in June and Year.

Metal	June		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$12,507,588	$1,577,544	$31,336,241	$38,504,393
Imports.	2,747,553	4,880,979	13,976,054	47,758,472
Excess	E.$9,740,035	I. $3,303,435	E.$17,360,197	E.$20,745,921
Silver:				
Exports.	1,556,410	4,439,634	17,505,359	26,387,699
Imports.	2,050,895	2,717,609	9,981,294	13,740,808
Excess	I. $494,395	E. $1,713,025	E. $7,524,065	E.$12,646,891

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending July 16 and total from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$7,000	$10,215	$872,020	$2,467
1904	63,686,962	3,573,844	22,163,114	473,971
1903	31,811,480	3,564,944	10,424,956	1,167,767
1902	16,538,282	1,316,432	14,318,660	738,354

Exports of merchandise from the United States in June are valued by the Bureau of Statistics of the Department of Commerce and Labor at $93,197,134; which is $3,310,209 more than in May, but $2,025,712 less than in June, 1903. For the six months ending June 30 the statement is as follows:

	1903.	1904.
Exports	$697,651,909	$673,728,365
Imports	512,734,509	507,995,266
Excess, exports	$184,917,400	$165,733,099
Add excess of exports, silver		12,646,891
Add excess of exports, gold		20,745,921
Total balance		$699,125,911

The gold and silver movement in detail will be found in the table at the head of this column.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending July 16 gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$907,015,500	$1,087,518,700
Deposits	895,208,100	1,179,169,400
Circulation	43,908,900	39,156,200
Specie	160,863,400	255,298,900
Legal tenders	76,217,100	84,056,800
Total reserve	$237,080,500	$339,355,700
Legal requirements	223,802,025	294,792,350
Balance surplus	$13,278,475	$44,563,350

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'd—	$160,863,400	.....	$255,298,900	.....
England—	182,984,925	.....	170,744,345	.....
France—	502,892,050	$224,527,680	546,716,765	$225,570,745
Germany—	163,850,000	57,565,000	161,840,000	56,865,000
Spain—	72,860,000	102,500,000	73,615,000	101,465,000
Netherlands—	19,700,000	32,741,500	27,383,000	32,635,000
Belgium—	14,900,000	7,450,000	15,416,665	7,708,333
Italy—	93,460,000	11,669,000	111,760,000	19,948,000
Russia—	396,630,000	45,225,000	469,435,000	41,865,000
Austria—	225,935,000	65,215,000	238,320,000	64,090,000

The returns of the Associated Banks of New York are of date of July 16, and the others July 14, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Indian bazaar inquiries have sustained the price of silver, and the market has been comparatively steady. No other new features are noted.

The United States Assay Office in New York reports receipts of 82,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to July 7 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£3,285,425	£5,386,423	I. £2,100,998
China	220,918	343,091	I. 122,173
Straits	421,779	58,103	D. 363,676
Total	£3,928,122	£5,787,617	I. £1,859,495

Receipts for the week were £157,000 in bar silver from New York, and £6,000 from Australia; total, £163,000. Shipments were £60,500 in bar silver to Bombay, £5,000 to Calcutta, and £2,500 to Colombo; total, £68,000.

Indian exchange has been fairly steady, and the Council bills offered in London brought an average of 15.96d. per rupee. Cash balances in India are large, and money is abundant. The sales of silver to India in June were very large, but the demand is now falling off.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.45½	$0.47½
Peruvian soles and Chinese pesos	.42	.44
Victoria sovereigns	4.86	4.87
Twenty francs	3.86	3.88
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

July.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb	Copper. London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter. N. Y., Cts. per lb.	Spelter. St. Louis, per lb. Cts.
14	12⅛ @12⅜	12⅜ @12½	12⅛ @12¼	57⅞	26¾	4 20	4.875	4.725
15	12⅛ @12⅜	12⅜ @12½	12⅛ @12¼	57⅛	26⅝	4.20	4 875	4.725
16	12⅛ @12⅜	12⅜ @12½	12⅛ @12¼	....	26⅝	4.20	4.875	4.725
18	12¼ @12¾	12⅜ @12⅝	12⅛ @12⅜	57⅝	26½	4.20	4.875	4.725
19	12¼ @12¾	12⅜ @12⅝	12⅛ @12⅜	57¾	26½	4.20	4.875	4.725
20	12⅛ @12¾	12⅜ @12⅝	12⅛ @12⅜	57⅛	26⅜ @26½	4 20	4.875	4.725

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

July	Sterling Exchange.	Silver New York, Cents.	Silver London, Pence.	July.	Sterling Exchange	Silver. New York, Cents.	Silver. London Pence.
14	4.87	57¾	26⅝	18	4.87	58⅛	26⅞
15	4.8705	57⅝	26⅜	19	4.8674	58¼	26⅛
16	4.87	58	26⅛	20	4.87	58⅜	26⅞

New York quotations are for fine silver per ounce Troy London prices are for sterling silver .925 fine.

Copper.—The market throughout the week has ruled very firm indeed, and the consumptive demand remains satisfactory. The closing quotations as given are 12½@12¾ for Lake copper; 12⅜@12⅝ for electrolytic in cakes, wirebars or ingots; 12⅛@12⅜ for cathodes, and 12⅛@12¼ for casting copper.

The market for standard copper in London, which last week closed at £57 10s., opened on Monday at £57 12s. 6d., advanced on Tuesday to £57 15s., but on Wednesday declined on the report of political complications, and the closing quotations are cabled as £57 10s@£57 11s. 3d. for spot and £57 7s. 6d.@£57 8s. 9d. for three months.

The statistics for the first half of July show a decrease in the visible supplies of 400 tons.

Refined and manufactured sorts we quote: English tough, £60@£60 10s.; best selected, £61@£61 10s.; strong sheets, £69 10s.@£70 10s.; India sheets, £67 10s.@£68 10s.; yellow metal, 6@6⅛d.

Exports of copper from New York and Baltimore for the week ending July 19 were 4,784 tons, chiefly to Germany, Holland, France and Great Britain. Imports for the week of July 15 were 105 tons copper and 2,443 tons ore.

Imports and exports of copper in Great Britain for the six months ending June 30 are given in the Board of Trade returns as below. The totals show the contents of all imports in fine copper; the figures being in long tons, of 2,240 lb.:

	1903.	1904.	Changes.
Copper ore	43,719	38,024	D. 5,695
Matte and precipitate	38,015	30,131	D. 7,884
Fine copper	29,768	43,300	I. 13,532
Imports, fine copper	53,148	62,168	I. 9,020
Exports	26,403	25,204	D. 1,199
Balance of imports	26,745	36,964	I. 10,219

Of the imports this year, 21 tons of ore, 2,899 tons of matte and 22,459 tons of fine copper were from the United States; against 327 tons ore, 2,504 tons matte and 9,614 tons fine copper last year.

Tin.—The usual summer dulness settled over the market and consumers showed very little interest, except for early deliveries. The quotations last week advanced to 26⅝, but have since given way, the closing prices being 26⅜@26½ for spot and futures.

The foreign market, which last week closed at £119 12s. 6d., opened on Monday at £119 12s. 6d., advanced on Tuesday to £119 15s., and the closing quotations are cabled at £119 15s.@£119 17s. 6d. for spot, and £120 10s.@£120 12s. 6d. for three months prompt.

Imports of tin into Great Britain with re-exports of imported metal were as follows for the six months ending June 30; the figures being in long tons:

	1903.	1904.	Changes.
Straits	10,673	14.201	I. 3,528
Australia	2,083	1,941	D. 142
Other countries	1,210	1,407	I. 197
Total imports	13.966	17.549	I. 3,583
Re-exports	10,650	13,220	I. 2,570
Net imports	3,316	4.329	I. 1,013

A large part of the re-exports were of Straits tin in transit to the United States.

Lead has ruled quiet, but steady, throughout the week and nothing of interest has transpired. The closing quotations are given as 4.20 New York and 4.12½ St. Louis.

The foreign market is firm, Spanish lead being quoted £11 12s. 6d.@£11 13s. 9d., and English lead £11 15s.@£11 16s. 3d.

Imports and exports of lead in Great Britain, for the six months ending June 30, were as follows, in long tons:

	1903.	1904.	Changes.
United States	18,532	17.204	D. 1,328
Spain	49,795	56.416	I. 6.621
Australia	31,211	35,582	I. 4,371
Other countries	11,541	15,403	I. 3,862
Total imports	111,079	124,605	I. 13.526
Exports	16,380	18,397	I. 2,017
Balance, imports	94,699	106,208	I. 11,509

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 2, that the price of silver during the week has been 14.25 reales per oz. Exchange is 34.92 pesetas to £1. Local quotation for pig lead is 65.50 reales per quintal, which, on current exchange, is equal to £10 9s. 9d. per long ton, f. o. b. Cartagena. Exports were 339,000 kg. pig lead, 400,000 kg. desilverized lead, and 815 kg. bar silver, all to Marseilles. There was also a shipment of 345 tons lead ore to Hamburg.

Spelter.—A sharp advance in the ore market is reported. On the other hand, the consumptive demand is nothing out of the ordinary. The quotations are unchanged at 4.72½ St. Louis and 4.87½ New York.

The foreign market remains firm, good ordinaries being quoted at £22 2s. 6d. and specials at £22 7s. 6d.

Exports and imports of spelter in Great Britain for the six months ending June 30 were as follows, in long tons:

	1903.	1904.	Changes.
Spelter	43,499	44,415	I. 916
Zinc sheets, etc.	10,610	11.626	I. 1,016
Total imports	54,109	56,041	I. 1,932
Exports	3,777	3,616	D. 161
Balance, imports	50,332	52,425	I. 2.093

Imports of zinc ores are not reported separately.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 2, that the demand for ore continues firm, and all the mines are well employed. Blende, 35% zinc, is quoted at 67 fr., and calamine, 30% zinc, at 47 fr. per metric ton. Exports include 3,700 tons zinc ore to Antwerp, 800 tons zinc ore to Swansea and 3,360 kg. spelter scraps to Marseilles.

Antimony is dull and neglected. We quote: Cookson's, 7@7⅜; Hallett's, 6⅜@6½; U. S., Italian, Japanese, French, Hungarian and Chinese, 5⅞@6c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are nominally $18.50 per ounce, but the tendency is upward, and higher prices are expected.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Quicksilver.—Prices are weaker all around. In New York large lots have been offered at $43.50 per flask, with $44.50 quoted for smaller orders. The San Francisco price continues $43@$44 for domestic business, but as low as $41.50@$42 has been offered for export. The London price is £7 17s. 6d., with the same quotation from second hands.

The dealers in, and miners of, quicksilver on the Pacific Coast have agreed to change the old weight of 76½ lb. quicksilver to the flask to 75 lb. This agreement took effect on June 1, and hereafter the flask will contain 75 lb. of quicksilver, and should be so reckoned. This change accounts in a small degree for the recent fall in prices, which, however, is due chiefly to lessened demand. The weight of the flask was based on the old Spanish pound, which was used many years ago by the Almaden mines in Spain, then the principal producer, and was generally adopted in the trade. During 1903, however, the Rothschilds, who control the Spanish and Austrian mines, changed the weight from the old Spanish to the English pound, making the weight in avoirdupois measure, 75 lb. to the flask. It was some time before the American producers found out that they were really giving 1½lb. more quicksilver to the flask than the European mines, but they have now recognized the fact.

Imports and re-exports of quicksilver in Great Britain, for the six months ending June 30, were as follows, in pounds:

	1903.	1904.	Changes.
Imports	2,480,401	2,348,048	D. 132,353
Re-exports	898,819	821,421	D. 77,398
Net imports	1,581,582	1,526,627	D. 54,955

There was a considerable decrease this year in the re-exports.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg., at Breslau, Germany. Manganese metal is quoted 360 marks per 100 kg., f. o. b. Bremen, Germany, Manganese tin alloy, 55% is quoted 365 marks per 100 kg. for first quality, and 225 marks for second quality, both f. o. b. Bremen.

For other minor details, and their alloys, wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1, 99% ingots	33@37c.	Ferro-chromium (74%)	12½c.
No. 2, 90% ingots	31@34c.	Ferro-Tungsten (37%)	38c.
Rolled Sheets	4c. up	Magnesium, pure (N. Y.)	60c.
Alum-bronze	20@22c.	Manganese	$2.75
Nickel-alum	33@39c.	Mangan'e Cop. (20% Mn)	32c.
Bismuth	$2.10	Mangan'e Cop. (30% Mn)	38c.
Chromium, pure (N. Y.)	80c.	Molybdenum (Best)	$2.00
Copper, red oxide	50c.	Phosphorus, foreign	45c.
Ferro-Molybde'm (50%)	$1.25	Phosphorus, American	70c.
Fe ro-Titanium (10%)	90c.	Sodium metal	50c
Ferro-Titanium (20@25%) N. Y.	55c.	Tungsten (Best)	88c

Variations in prices depend largely upon sizes and conditions of orders.

Missouri Ore Market. July 16.

(From Our Special Correspondent.)

The highest price paid for zinc ore during the week was $40 per ton, for at least two bins of ore, $3 per ton higher than a week ago and $5 per ton higher than two weeks ago, when this ore struck bottom at $35 per ton top and an assay basis of $30@$32. This week the assay price has ranged from $35 to $37 per ton of 60% zinc. The higher price paid for zinc ore is apparently attributable to the restricted output occasioned by the observance of a World's Fair holiday of two weeks by a number of the heaviest producers. During the two weeks the output aggregated about the average of one week's output, thus decreasing the immediate supply at least 5,000 tons.

Following are the ore sales for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,209,740	313,800	$48,245
Duenweg	1,412,970	170,040	30,025
Webb City-Carterville	991,230	104,240	19,170
Galena-Empire	591,070	77,000	11,535
Aurora	545,300	11,350	7,725
Alba-Neck	385,480	.....	6,940
Prosperity	307,210	41,190	6,485
Granby	366,050	43,000	5,425
Carthage	230,290	.....	4,145
Zincite	187,230	.....	3,370
Sherwood	131,600	6,390	2,505
Oronogo	135,010	12,920	2,445
Badger	130,560	.....	2,350
Diamond	109,280	.....	1,910
Beef Branch	75.810	44,130	1,700
Central City	32,160	12,930	830
Cave Springs	43,170	2,680	810
Spurgeon-Spring City	29,430	22,610	800
Totals	7,913,590	862,280	$156,415
29 weeks	289,289,140	36,250,470	$5,769,200

Zinc value, the week, $133,315; 29 weeks, $4,766,870.
Lead value, the week, 23,100; 29 weeks, 1,002,330.

Spelter has not responded to the advanced price of zinc ore, and the smelters are paying for their ore supply nearly eight times as much per ton as they are receiving per hundred for their spelter. There is some fear entertained, now that ore prices have been restored, of a danger to the market by a threatened strike among the coal miners. While the natural gas smelters would not be directly affected, yet a prolonged strike at this time would mean a considerably restricted output of zinc ore, and thus force the gas smelters to shut down from lack of ore. With the very low reserve stock now at the mines, and the threatened danger of a coal miners' strike, the indications point to a stiff spelter market.

Average Prices of Metals per Lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903	1904.	1903.	1904.	1903.	1904.
Jan...	28.33	28.845	4.075	4.347	4.885	4.883
Feb..	29.43	28.087	4.075	4.375	5.043	4.916
Mar..	30.15	28.317	4.442	4.475	5.349	5.057
April.	29.81	28 132	4.567	4.475	5.550	5.219
May .	29.51	27.718	4.325	4.423	5.639	5.031
June .	28.34	26.325	4.210	4.196	5.697	4.760
July..	27.68	.....	4.075	.....	5.662	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	26.77	....	4.243	.....	5.686	....
Oct...	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.038	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5,038c.; May, 4,853c.; June, 4.596c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb..	12.778	12.663	12.901	12.245	57.34	56.57
Mar..	14.416	12.299	14.572	12 551	63.85	57.321
April.	14.454	12.923	14.642	13.120	61.72	58.247
May..	14.435	12.758	14.618	13 000	61.73	57.321
June .	13.942	12.269	14.212	12.399	57.30	56.398
July..	13.094	.....	13.341	.....	56.64	.....
Aug..	12.962	.....	13.159	.....	58.44	....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec..	11.952	.....	12,084	.....	56.96	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan..	25.62	55.56	21.98	47.57	26 423	57.055
Feb..	25.41	55.09	22.11	47.89	26.665	57.592
Mar..	25.00	54.23	22.49	48.72	26.164	56.741
April.	24.34	52.72	23.38	50.56	24 974	54.202
May..	23.71	51.31	24.89	54.11	25.578	55.490
June .	24.17	52.36	24.29	52.86	25.644	55.673
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce. .925 fine.

DIVIDENDS.

Company	Latest Dividend—Payable.	Rate.	Total.	Total to date.
†Am. Sm. & R., com.	July 26	1.25	625,000	1,875,000
Arizona Cop., def. ord.	July 27	.34	21,751	.....
Arizona Cop., pf. ord.	July 27	.34	121,191	.....
Camp Bird, Colo.	Aug. 6	.18	147,600	1,607,304
Continental Zinc, Mo.	July 1	.40	8,800	79,200
Greene Con., Mex.	Aug. 1	.30	259,200	1,170,220
*Homestake, S. D.	July 25	.25	54,600	12,749,950
Home Oil, Cal.	July 20	.02½	2,500	500,000
Iron Silver, Colo.	Aug. 1	.10	50,000	3,050,000
†Jamison, Cal.	July 18	.03	11,700	156,000
Keystone Oil, Colo.	July 10	.00⅝	8,000	8,000
*Lightner, Cal.	July 20	.05	5,113	222,406
Mammoth, Utah	July 15	.05	20,000	1,880,000
*Mines Co. of Am.	July 20	.01¼	25,000	630,000
N. Y. & Hond. Rosario.	July 23	.10	15,000	1,860,000
Osceola, Mich.	July 28	1.00	96,150	4,439,600
*Pac. Coast Borax, Cal.	July 29	1.00	19,000	1,839,500
†Phil. Nat. Gas, com.	Aug. 1	.75	398,888	4,613,495
†Pittsburg Coal, pf.	July 25	1.75	519,771	9.875.549

*Monthly. †Quarterly.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Allouez, Mich	Sept. 26	.....	$1.50
Am. Quartz, Cal.	July 25	.....	.10
Andes, Nev.	July 11	Aug. 1	.10
Challenge Con., Nev.	July 13	Aug. 3	.10
Chollar, Nev.	July 13	Aug. 3	.10
Comstock, Utah	July 27	Aug. 15	.10
Con. Imperial, Nev.	Aug. 10	Sept. 6	.01
Exchequer, Nev.	Aug. 3	.....	.05
Gould & Curry, Nev.	Aug. 12	Aug. 30	.10
Jenny Lind, Cal.	July 30	.....	.01
Julia Con., Nev.	Aug. 11	Sept. 1	.03
National Con., Cal.	July 23	Aug. 27	.05
Potosi, Nev.	July 20	Aug. 10	.10
San Domingo, Cal.	Aug. 2	.....	.25
Savage, Nev.	July 15	Aug. 5	.10

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	July 13 H.	July 13 L.	July 14 H.	July 14 L.	July 15 H.	July 15 L.	July 16 H.	July 16 L.	July 18 H.	July 18 L.	July 19 H.	July 19 L.	Sales.
Alice	$25											25		50
Alpha, g. s.	1					8								200
Amalgamated, c.	100	51⅜	51¼	53¾	51⅛	53¾	52⅛	53½	52⅜	54¼	53	54	53	251,450
Anaconda, c.	25			76	73½	76¼	73			76	75	76½	76	5,300
Belcher, s.	3	19												300
Brunswick	1													
Caledonia, s	1					55								100
Challar	2½					17								300
Confidence, s.	3			75										100
Con.Cal.&Va., g.s.	2½	1.15		1.15				1.15						500
Con. Imperial, s.	1					2								500
Or. Creek, Con., g.	1					7								500
Crown Pt., g. s.	1											14		100
Elkton, g.	1	67				66	65	65				65		1,300
Gold Dollar	1													
Greene Con., c.	10	15¼	15	15½	15¼	15¼		15⅛		15¼		15¼	15	5,380
Hale & Norc's,g.s.	3											70		300
Homestake, g.	100													
Horn Silver, s. l.	20	1.45												205
Iron Silver	1													
Isabella, g.	1							22						1,000
Jack Pot, g.	1													
Justice, s.	21					17		19				13		300
Little Chief	50													
Mexican, s.	3	95												200
Moon Anchor, g.	3													
Moulton	25													
Occidental, s.	3													
Ontario, s. l.	100			3.85										10
Ophir, s.	5	2.70	2.65									2.35		400
Pharmacist	1													
Phœnix, g.	1	28	24	27	25	26	24	28	20			13		19,100
Portland, g.	1											1.65		200
Potosi, s.	1	11												100
Quicksilver	100													
Quicksilver, Pf.	100													
Savage, s.	3													
Sierra Nevada s.	3					30								100
StandardCon.,g.s.	10											2.30		100
Syndicate	1													
Tennessee, c.	25													
Union Con., g. s.		34		32										200
Union Copper	10			¾		1.00						⅞		400
United Copper	100													
White Knob, c.	10	4⅝										5		200
Work, g.	1					7		7						3,500

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 292,395 shares.

BOSTON, MASS.

Company.	Par val	July 13 H.	July 13 L.	July 14 H.	July 14 L.	July 15 H.	July 15 L.	July 16 H.	July 16 L.	July 18 H.	July 18 L.	July 19 H.	July 19 L.	Sales.
AdventureCon.,c	$25	1½	1⅜	2	1⅝	1⅞	1¾	1⅝	1⅜	1⅝	1	1		2,025
Allouez, c.	25	8⅞	8¾	8¼	8⅛	8⅛	8¼	8⅛	8⅜	8⅛	8¼	8⅜	8⅛	2,605
†Amalgamated,c.	100	51¾	51⅜	53¾	51¾	53¾	52½	53¼	52½	54⅛	53	54	52⅞	31,321
Am. Zinc	25			10⅞	10	10	9⅝	10⅜	10¼			12⅛	10⅛	2,250
Anaconda, c. s.	25											18¾		25
Arcadian, c.	25	50				85						80	70	50	80	665
Arnold, c.	25	9												
Atlantic, c.	25	25⅞	8	9	8⅝			9	8¾	8		9		1,150
Bingham Con.	50		25⅛	26	25⅞	25¾	25¼	25¾	25¼	25⅞	25	26⅜	25¼	8,095
Bonanza	10	7 0						55	50	55				1,015
Calumet & Hecla	25		485	470		470				470		470		64
Catalpa, g.	10	24⅝				9								100
Central Oil												9¼	8½	110
Centennial, c	25	24	24⅜	25	24¼	24⅜	24	24¾	24⅜	25¼	24⅜	25⅜	24¾	9,807
Con. Mercur, g.	5	53¾				22	20					20		1,233
Copper Range	100	22¼	51	53⅝	50¾	53¼	52¼	53⅜	52½	53	53	57	54⅜	47,484
†Dalr West, g.s.l	20		21¼	21⅜	20⅜	22¼	18	18½	18	18¾	15	17¾	14½	6,903
Dominion Coal	100			44¾	43⅝	44⅝	41½			45		45		440
Preferred						104		104		104		105		128
Dominion I. & S.	100			9		9	8¾	9						320
Elm River, c.	12	2½		2⅛		2¼		2¼	2⅛	2⅜	2¼	2¼		875
Franklin, c.	25	3⅛		8	7½	8	7¾			8		7½		606
Granby Con.	10	1⅝	3	3⅛	3	3		3		3		3⅛	3	5,680
Guanajuato Con.	5	11½	1⅜			1¾	1⅜	1⅝		1⅝	1⅜	1⅜		1,830
Isle Royal Con.	25	4½	9	11¾	10½									6,129
Mass Con., c.	25		4¼	4½	4¼	4½		4⅜				4¾		500
Mayflower, c.	25	4½				45		50						400
Michigan, c.	25	44		4½		4¾	4½	4¾	4½	4¾	4⅜	4¾		719
Mohawk, c.	25		43¼	44¾	44	44¼	43½			44¾	43½			2,512
Mont. Coal & C.	25	4												300
New Idria, q.	5	8¼												10
Old Colony, c.	25					1.00	75	1.00				87½		1,670
Old Dominion, c.	25	14½	13⅜	14		14		14		14		14¼	13½	2,620
Osceola, c.	25	64	63½	63¾	63½	63¼	62½	62		63		63	62	921
Parrot, s. c.	10	25	24¼	24	24¼	25⅜	25			25¼	25	25¼		2,586
Phœnix Con, c.	25	1⅝	1½	1½		1½				1½				450
Quincy, c.	25	88½	85½	89¼	86	89				89		87		321
Rhode Island, c.	25					1½	1	1½		1		80		330
Santa Fe, g. c.	10	1¾	1½	2	1¾	2½	1¾	2½	2	2¼	1¾	2	1½	28,160
Shannon, c.	10	5¾	5½	5⅞	5¾	5¾	5½	5¾		5¾	5¾	6	5¾	5,880
Tamarack, c.	25	94	93½	93		93	92			93	90	90¼	90	197
Tecumseh, s.	25	50												180
Trinity, c.	25	6⅞	6½	6¾	6½	6⅞	6	7	6¾	7⅝	7	7¾	7¼	15,926
United States, g.	10	22	21½	21⅞	21½	21⅞	21⅜	21⅝	21¼	22	21½	23½	21⅝	18,556
U. S. Coal & Oil	25	11¼	10½	12	11⅜	11⅜	11½	11⅜	11⅝	11⅜	11½	11⅝		2,440
Utah Con., g. c.	5	37½	36½	37½	37	37¾	37¼	38	37½	38¼	37	38¼	37¾	23,142
Victoria, c.	25	2⅝	2⅜	3⅛	3	3¼	3⅛	3¼	3	3⅜	3⅛	3½	3¼	3,065
Winona, c.	25	8¼	7⅞	8¼	8	8⅛	8¼	8⅜	8⅛	8¼	8	8¼	8	4,333
Wolverine, c.	25	77	76½	77	76	76				75½				491
Wyandot, c.	25			75		75		87½		85		65		1,150

c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver. Total sales, 147,470 shares.
†Ex-dividend. §First installment paid.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	July 13 H.	July 13 L.	July 14 H.	July 14 L.	July 15 H.	July 15 L.	July 16 H.	July 16 L.	July 18 H.	July 18 L.	July 19 H.	July 19 L.	Sales
Allis-Chalmers	$100											9¼	9	400
Preferred	100					45				44		45	44¾	500
Am. Agr. Chem	100													
Preferred	100													
†Am. Sm. & Ref.	100	54⅜	54⅜	55¾	54½	56	55¼	57	55¾	57¼	56⅞	57⅜	56⅞	30,133
Preferred	100	97⅜	97½	98⅜	98¼	98½	98⅜	98	98¼	98	98¼	98¼	98⅛	6,132
Col. Fuel & I.	100	33¼	31⅞	33	31	32⅝	32	32¾	32⅜	33	32¼	35	33¼	8,760
Col. F. & Iron, Pf.	100													
Col. & H. C. & I.	100	9		9⅞	9¼	9¼		9⅛						705
Crucible Steel	100	5¼	5⅛	5⅜	5¼	5⅜	5⅛	5½	5⅜	5¾	5⅝	5½		3,023
Preferred	100	37¼	37	37¼		36⅜		36¼	36⅛	38⅛	36⅜	36⅜		1,220
General Chem	100													
Preferred	100													
Mong. R. Coal	50	8												8
Preferred	50			20		20				20				46
National Lead	100	24¼	23⅜	24	23¼	24	23	23½	22¾	24	23¼	23¼	23	7,250
Preferred	100	94¼				93								200
Phila. Nat. Gas	100			39½	39	40⅛				40				1,380
Preferred	100	45½		45½						57⅛	57¼			425
Pittsburg Coal	100											14¼	13¾	105
Preferred	100	59	58	58¾	58	57½	57					57¼	56	1,702
Republic I. & S.	100	7¼	7	7¼		7½	7⅛	7½		8	7½	7⅞	7⅝	6,255
Preferred	100	43	42¾	43¼	42½	42¾		43⅛	42¾	44⅛	43	43¼	43	9,455
Sloss-Shef S. & I.	100	37	36											1,100
Preferred	100			85	84¾	84½		85		85				450
†Standard Oil	100	6.30	6.28	6.28	6.25			6.27	6.26½	6.27¼		624¾	624½	100
Tenn. C. I. & R.R.	100	39¾	39	39	38⅝	39		39⅜	39⅛	40⅛	39⅛	40¼	39¼	10,980
U.S.Steel Corp.	100	11⅞	11⅛	12	11⅜	12	11⅛	12⅜	11⅞	12⅝	12⅜	12⅝	12⅛	158,455
Preferred	100	61⅛	60⅛	61⅛	60¼	60⅞	60⅛	62⅜	60⅝	63	61⅞	62⅛	61⅜	303,973
Va.-Car Chem.	100	25½	24⅝	25½	25	25½	25⅛	25½		26⅜	25¼	28	24	7,400
Preferred	100									100¾	100½	100½	100⅜	550

*Pittsburg exchanges; all others, New York. Total sales, 560,683.

COLORADO SPRINGS, COLO.

Company.	Par Val	July 9 H.	July 9 L.	July 11 H.	July 11 L.	July 12 H.	July 12 L.	July 13 H.	July 13 L.	July 14 H.	July 14 L.	July 15 H.	July 15 L.	Sales
Acacia	$1			6⅜	5⅞	6¼	5⅝	6¼	5⅞	6¼	5⅞	6⅜	5⅞	3,000
Anaconda	5			14	12	14	12	14	12	14	12			
Colo. City & M.	1			2	1¾			1¾	1¼	1¾	1¼	1¾		8,000
C. K. & N.	1			34	32	33½	32½	34	32	34	32	33½	33	
Cripple Ck. Con.	1			7¾	7⅜	7¾	7⅜	7¾	7¼	7¾	7¼	7⅝	7⅜	7¼	1,000
Des Moines	1			2¼	1	1		1		2				
Doctor-Jack Pot.	1			4¾	4⅜	4⅝	4⅜	4⅝	4⅜	4⅝	4⅜	4⅝	4⅜	4,000
Elkton Con.	1			70	69½	67¾	66¾	67½	66⅜	65	64½	65	63½	10,000
El Paso	1			87½	87	90	88	88¼	87¾	88¼	87½	86		12,400
Gold Dollar Con.	1			5	4½	4⅞	4⅝	4⅞	4½	5	4½	5	4½	1,000
Gold Sovereign	1			6¾	6¼	6¾	6⅜	6¾	6⅜	6¼	6¼	6⅜	6¼	11,000
Golden Cycle	1			45	40	45	45	45	40	45	40			
Golden Fleece	1													
Hart	1			4	2	4	2	4	2	4	2			
Isabella	1			24	22½	23	22	21	20	20	18	22¼	20	14,500
Jack Pot	1			8			6	8		6				
Keystone	1			5	4⅝	5	4½	5	4½	4⅝	4⅜	4⅝	4½	3,000
Last Dollar	1			40		40		40		40				
Lexington	1			3⅝	3½	4	3¼	4	3⅝	3⅞	3⅜	3⅝	3¼	1,000
Little Puck	1			3⅞	3⅝	5	3⅞	3⅞	3¾	3⅞	3⅝			19,000
Mollie Gibson	1			5⅛	4⅞	5¼	4⅞	5	4¾	5½	4½	5¼	4½	2,050
Moon-Anchor	5			8¼		8		8	7	8				
New Haven	5			3¼	2⅞	3⅛	2¾	3¼	2¾	3¼	2⅝			1,000
Old Gold	1			9¼	9	9¼	9	9¼	8½	9¼	8¾			2,000
Pharmacist	1			3½	3¼	3¼	3¼	3¼	3⅛	3⅜	3			1,000
Pinnacle	1			3		3		3		3				
Portland	1			1.60	1.50	1.56	1.50	1.56	1.54½	1.58	1.53	1.60	1.52	1,600
Vindicator Con.	1			85	65	85	65	85	65	85	65	68		
Work	1			6⅝	6¼	6¾	6¼	6¾	6	6¾	6⅝	6⅞	6⅝	6⅝	

Total sales, 86,550 shares.

SAN FRANCISCO.

Company.	Location.	July 7 H.	July 7 L.	July 8 H.	July 8 L.	July 9 H.	July 9 L.	July 11 H.	July 11 L.	July 12 H.	July 12 L.	July 13 H.	July 13 L.	Sales
Golden Anchor	Nev.	27		28	26					27				6,900
MacNamara	Nev.	51	51	60	52	59	58	60	57	61	54	56	54	47,065
Mont. Tonopah	Nev.	2.52½	2.45	2.55	2.45	2.55	2.47½	2.60	2.47½	2.52½	2.50	2.52½	2.47½	16,240
Ton. Belmont	Nev.	88	83	86	83	87	86	85		84	82	83	82	13,200
Ton. & Calif'nia	Nev.													
Ton. Midway	Cal.	64	58	59		60	59	60	58	60	59	58		10,550
Ton. Mg. Co.	Nev.	8.25		8.25		8.25				8.12½	8.00	8.25		13,830
Ton. North Star.	Nev.	34				35	34	35	33	38	33	36	33	13,600
Ton. & Salt Lake	Nev.													

Total sales, 108,385 shares.

COLORADO SPRINGS (By Telegraph).

Company.	July 18 H.	July 18 L.	July 19 H.	July 19 L.
Anaconda	16	12		
Cripple Ck Con.	8	7⅝		7¾
C. K. & N.	34	33	35	33¾
Doctor-Jack Pot.	4¾	4	4¾	4⅝
Elkton Con	64		68	64
El Paso	86½	86	8⅞	86½
Gold Dollar Con.			5	4½
Gold Sovereign	6¾	6¾	6⅞	6¾
Isabella	22½	20	22	20½

Company.	July 18 H.	July 18 L.	July 19 H.	July 19 L.
Jack Pot	6			
Last Dollar	40			
Mollie Gibson	5	4¾		
Moon Anchor	8			
Old Gold	8½			
Pharmacist	3⅜	3	3⅜	3½
Portland	1.60	1.50	1.60	1.57
Vindicator	66			
Work	6⅝	6⅜	6¾	6¾

SAN FRANCISCO (By Telegraph).

Company.	July 18.	July 19.
Belcher	17	17
Best & Belcher	64	65
Caledonia	45	50
Challenge Con.	18	20
Challar	15	16
Confidence	75	70
Con. California & Virginia	1.00	1.05
Crown Point	13	14
Gould & Curry	11	11
Hale & Norcross	70	70
Mexican	90	85
Ophir	2.20	2.30
Overman	11	14
Sierra Nevada	24	24
Union Con.	22	23
Yellow Jacket	22	23

PHILADELPHIA, PA

Company	Par val.	July 13 H.	July 13 L.	July 14 H.	July 14 L.	July 15 H.	July 15 L.	July 16 H.	July 16 L.	July 18 H.	July 18 L.	July 19 H.	July 19 L.	Sales
Am. Cement	10													
Cambria Iron	50	47⅛	47			47½								230
Cambria Steel	50	20⅝	20⅜	20⅝	20⅜	20⅝	20⅜	20⅝	20¾			20⅞	20¾	20⅞	20⅝	4,581
Int. Smokel's Pd.	100	15		15¼	15									16	15	1,480
Int Sm. Pd. Pfd.	100															
Lehigh C. & N.	50	80⅜		80⅛	80	80½								80		285
Mont. Tonopah	1	2.50							2.50							
Phil'adelphia	50	39	38⅛	39⅝	38⅛	40⅝	39¾	40¼	39¾	40½	39¾	40		19,969
Phila. Pfd.	50	43¼					45¼	45⅝		45⅝					190
Tonopah	100	8.00	7.87	8.12	8.00	8.00				8.00						
Tonopah, Belm.	1	85		85		85		85								
United Gas & C'l.	50	85⅞	85⅛	86⅞	86¼	87	86	86½	86	87	86¾	86⅞	86½	3,950
Westmoreland C.	50	1.80						80								14

Total sales 30,699.

STOCK QUOTATIONS

ST. LOUIS, MO.* July 16

Name.	Par Val.	Prices. Bid.	Ask.	Name.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo....	$10	$0.15	$0.25	Columbia Lead, Mo.	$10	$3.00	$4.00
Catherine Lead, Mo.	10	1.00	2.00	Con. Coal, Ill.....	100	16.00	18.00
Central Coal & C....	100	59.50	61.00	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf..	100	71.00	72.50	Granite Bimet. Mt..	10	.41	.50
Central Lead, Mo...	100	110.00	115.00	St. Joe Lead, Mo,...	10	14.50	16.00

*By our Special Correspondent.

SALT LAKE CITY.* July 16

Company	Par Val	High	Low	Sales.	Name of Company	Par Val	High	Low	Sales.
Butler Liberal.	1	10¾	10⅛	11,500	May Day.....	¼	1¾	1⅝	59,000
Carisa.....	1	6	6	600	N. Y. Bonanza	1	1⅜	⅞	2,300
Century.....	1	50	48½	2,500	Naildriver.....	5	.....	.....	.....
Con. Mercur..	5	23	19½	6,800	Sacramento.....	.....	12½	10	22,000
Daly.....	.....	2.50	2.50	300	Silver Shield ..	20	5¼	4¾	3,000
Daly West.....	1	22.85	18.25	225	Silver King.....	.....	50	50	25
Daly Judge	20	4.20	4.20	20	Star Con.....	1	13½	12⅜	7,700
Galena.....	.....	.....	.....	.....	Swansea.....	.....	44	44	300
Grand Central.	1	4.10	4.10	100	Tetro.....	1	34	34	500
La Reine.....	1	.....	.....	.....	Tonopah Belm.	.....	.....	.....	.....
L. Mammoth....	.....	16	.16	200	Uncle Sam, Con	1	16	16	400
Little Chief....	1	.....	.....	.....	Victor Con.....	.....	1½	1½	500
Mammoth.....	.....	.....	.....	.....	Yankee Con	1	34	34	1,300

*By our Special Correspondent. All mines are in Utah. Total sales, 59,270 shares.

MONTREAL.* July 15

Company	Par val.	Quotations High	Low	Sales	Company	Par val	Quotations High	Low	Sales
Dominion Coal.	100	44.50	41.00	435	Montreal Steel..	100	40.00	35.00	.....
Dom. Coal, Pf...	100	104.75	104.00	240	Mont'l Steel, Pf.	100	100.00	75.00	.....
Dom. I. & St...	100	9.00	8.00	430	Nova Scotia St..	100	65.00	60.00	1,900
Dom. I. & St..Pf.	100	24.25	23.00	275	N. S. Steel, Pf..	100	.....	.....	.....
Internat'l Coal..	100	100.00	.....	.....	Ogilvie.....	100	.....	.....	.....
Int'l Coal, Pf....	100	100.00	.....	.....	Ogilvie, Pf.....	100	120.00	119.00	75

*Montreal Stock Exchange. Total sales, 10,259 shares.

DULUTH, MINN. May 28.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona.....	$10	$100	$105	Lake Sup. & Pitts Dev..	$10	$145	$150
Calumet & Bisbee.....	10	3.00	4.50	Pitts. & Duluth Dev....	15	33.50	36.00
Calumet & Cochise....	10	5.00	5.50	Shakespeare.....	10	.....	.20
Calumet & Pittsburg...	10	25.00	28.00	United Mexican.....	10	.....	.50
Higgins Development..	10	2.00	2.50	Wolverine & Arizona...	10	3.50	.....
Junction Development	15	18.00	21.00	Yaqui.....	10	.....	1.00

MEXICO. July 8

Company.	Shares Issued	Prices, Mex. Bid.	Ask.	Company.	Shares Issued.	Prices, Mex. Bid.	Ask.
Durango:				Trompillo.....	1,200	$1,900	$1,950
Ca. Min. de Penoles..	2,500	$2,700	$3,200	San Rafael y An., aviada.....	1,200	730	740
San Andres de la Sierra	200	10,000	.....	Soledad, aviada.....	670	800	810
Guanajuato:				Sorpresa, aviada.....	900	300	320
Angustias, Pozos....	2,400	41	44	**Mexico:**			
Cinco Senores y An., aviadoras.....	2,000	40	45	Alacran.....	2,400	20	28
Cinco Senores y An., aviada	400	40	45	Aldebarren.....	2,000	40	43
Providencia, San Juan de la Luz	6,000	55	63	Buen Despacho.....	3,000	60	6
Queensland y Australia.....	300	10	20	Dos Estrellas.....	3,000	2,020	2,200
Guerrero:				La Esperanza (El Oro.).....	3,000	1,500	1,500
Delfina, 1st serie.....	2,500	30	40	La Reformia, aviadores.....	2,000	28	32
Delfina, 2nd serie....	2,500	25	30	Santa Ana, Esperanza.....	2,400	.....	90
Garduno y Anexas...	7,200	35	40	**Michoacan:**			
Hidalgo:				Luz de Borda, aviadora.....	3,000	13	22
Amistad y Concordia	9,600	80	81	Luz de Borda, aviado.....	1,000	18	17
Carmen, aviada.....	1,100	85	95	Santiago y An., Tlal..	4,000	8	10
Guadalupe Fresnillo Mill	1,000	170	200	**Nuevo Leon:**			
Guadalupe Fresnillo Mine.....	1,400	70	80	La Fraternal.....	1,000	580	620
La Reina y An., aviadora.....	5,600	2	4	Norias de Bajan.....	1,000	880	920
Luz de Maravillas, aviadas.....	1,100	.....	20	**San Luis Potosi:**			
Maravillas y An., aviador.....	1,680	110	150	Concepcion y An.....	3,000	70	80
Maravillas el Lobo ..	1,000	130	180	El Barreno, aviadora.	2,000	69	72
Palma y An., aviador.....	1,800	4	8	Sta. Maria de la Paz..	9,800	184	186
Refugio, aviada.....	12,800	680	740	San Diegoy Annexas.	2,400	7	10
Santa Anay An., aviadora.....	500	50	70	**Zacatecas:**			
Santa Anay An., aviada.....	600	25	35	Asturiana y An.....	2,500	45	50
Sta. Gertrudis y An., aviadas.....	9,600	13½	15	Candelaria y Pinos..	2,500	10	20
Sta. Gertrudis y An., aviadora.....	28,800	80	80½	Esperanza y An.....	2,400	6	8
Santo Tomas Apostol aviadoras.....	5,100	2	3	Lourdes.....	2,500	21	25
San Felipe de Jesus, aviadora.....	3,600	15½	17	Luz de Minillas, pagadoras.....	2,000	.....	.....
San Felipe de Jesus, aviada.....	1,200	3	6	Nueva Quebradilla, aviadoras.....	2,400	25	40
San Rafael y An.,				Nueva Quebradilla, aviadas.....	600	20	40
				San Carlos y Annexas	2,500	50	60
				Sta. Maria de Gaud..	2,500	87	95
				Miscellaneous:			
				Bartolome de Medina	2,000	98	100
				Naica (Chihuahua.)..	100	11,000	13,000
				Natividad (Oaxaca) aviadora.....	1,800	950	1,000
				San Francisco Hac...	6,000	73	84
				Union Hacienda.....	3,000	290	310

LONDON. July 8

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Date.	Quotations. Buyers.	Sellers.
American:		£. s. d.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell	200,000	5 0 0	1 6	Apr., 1904	4 10 0	4 15 0
Anaconda.....	1,200,000	5 0 0	2 0	May, 1904	3 13 9	3 16 3
Camp Bird.....	830,000	1 0 0	9	Aug., 1904	1 6 3	1 8 9
Copiapo.....	112,500	2 0 0	6 10	May, 1903	17 6	1 2 6
*De Lamar	80,000	1 0 0	1 6	May, 1904	12 6	15 0
El Oro.....	1,080,000	1 0 0	9	July, 1904	1 2 6	1 5 0
Esperanza.....	455,000	1 0 0	1 0	June, 1904		
Frontino & Bolivia....	128,892	1 0 0	3 0	July, 1901	6 3	8 9
Le Roi.....	200,000	5 0 0	5 0	Nov., 1899	16 3	18 9
Le Roi No. 2.....	120,000	5 0 0	1 0	June, 1904	13 9	16 3
Palmarejo & Mexican...	445,000	1 0 0	rts.	April, 1903	7 6	8 6
Standard.....	500,000	4 0	2½	Sept., 1903	2 6	3 6
Stratton Independence.	1,000,007	1 0 0	6	Dec., 1903	2 3	2 9
*St. John del Rey.....	546,285	1 0 0	6	Dec., 1903	11 6	12 6
Tomboy.....	300,000	1 0 0	1 0	June, 1902	1 5 0	1 10 0
Ymir.....	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
European:						
Linares.....	15,000	3 0 0	5 0	Apr., 1904	3 5 0	3 15 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	2 17 6	3 2 6
Rio Tinto	325,000	5 0 0	37 6	May, 1904	52 17 6	53 2 6
Rio Tinto, preferred ...	325,000	5 0 0	2 6	May, 1904	6 0 0	6 5 0
Tharsis.....	625,000	2 0 0	7 0	May, 1904	4 7 6	4 12 6
West Australian:						
Associated	495,388	1 0 0	2 6	July, 1904	2 12 6	2 15 0
Cosmopolitan.....	400,000	1 0 0	1 0	Apr., 1904	9 6	10 0
Golden Horseshoe.....	300,000	5 0 0	6 0	Apr., 1904	7 7 6	7 10 0
*Great Boulder.....	1,750,000	2 0	1 0	June, 1904	1 5 0	1 5 6
Gt BoulderPersever'ce	1,400,007	1 0 0	1 3	May, 1904	11 0	11 6
Great Fingall.....	250,000	1 0 0	7 0	July, 1904	8 6 3	8 9 0
Ivanhoe.....	200,000	5 0 0	5 0	July, 1904	7 12 6	7 15 0
Kalgurli	120,000	1 0 0	2 6	July, 1904	5 7 6	5 10 0
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 5 0	1 7 6
*Oroya-Brownhill	450,000	1 0 0	3 0	June, 1904	3 3 9	3 7 6
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	1 0	July, 1904	2 15 0	3 0 0
Briseis.....	600,000	1 0 0	.....	.....	7 6	8 0
Broken Hill.....	960,000	8 0	1 0	May, 1904	1 16 11	1 17 7
*Mt. Lyell.....	275,000	3 0 0	1 3	June, 1904	12 6	13 6
Mt. Morgan.....	1,000,000	1 0 0	3	July, 1904	2 6 3	2 8 9
Waihi.....	497,412	1 0 0	4 6	June, 1904	5 8 9	5 11 3
Indian:						
Champion Reef.....	513,832	10 0	1 3	May, 1904	1 12 6	1 13 9
Mysore.....	566,043	10 0	4 6	July, 1904	6 11 3	6 13 9
Nundydroog.....	484,000	10 0	1 3	July, 1904	1 12 3	1 13 5
Ooregum.....	343,000	10 0	1 3	Apr., 1904	18 1	1 0 7
Ooregum, pfd.....	240,000	10 0	1 3	Apr., 1904	1 8 9	1 11 3
South African:						
Angelo.....	600,000	1 0 0	7 0	July, 1904	7 0 0	7 2 6
Bonanza.....	200,000	1 0 0	8 0	Aug., 1904	1 5 0	1 7 6
British South Africa....	4,436,019	1 0 0	rts.	May, 1899	1 10 0	1 12 6
Cape Copper.....	300,000	2 0 0	2 6	July, 1904	3 2 6	3 7 6
Cape Copper, pfd.....	75,000	2 0 0	2 6	July, 1904	3 5 0	3 10 0
City & Suburban	340,000	4 0 0	4 0	Aug., 1904	6 2 6	6 7 6
Consol. Gold-Fields....	2,000,000	1 0 0	.....	.....	6 5 0	6 7 6
Crown Reef.....	120,000	1 0 0	6 0	Aug., 1904	14 17 6	14 12 6
De Beers, preferred....	800,000	2 10 0	10 0	July, 1904	18 11 3	18 13 9
De Beers, deferred.....	1,000,000	2 10 0	12 6	July, 1904	18 16 3	19 1 3
East Rand.....	980,000	1 0 0	5 0	July, 1903	7 10 0	7 12 6
Ferreira.....	90,000	1 0 0	22 6	Aug., 1904	20 10 0	21 0 0
Geldenhuis	200,000	1 0 0	7 0	Aug., 1904	5 10 0	5 12 6
Geduld.....	400,000	1 0 0	rts.	Mar., 1902	6 2 6	6 5 0
Henry Nourse.....	125,000	1 0 0	8 0	Aug., 1904	8 7 6	8 12 6
Jubilee.....	50,000	1 0 0	5 0	Aug., 1904	4 12 6	4 17 6
Jumpers.....	100,000	1 0 0	2 6	May, 1904	2 15 0	3 0 0
Langlaagte.....	470,000	1 0 0	2 0	Aug., 1904	3 12 6	3 15 0
May.....	288,750	1 0 0	3 0	Aug., 1904	3 18 9	4 1 3
Meyer & Charlton.....	100,000	1 0 0	5 0	Aug., 1904	5 7 6	5 12 6
Modderfontein	280,000	1 0 0	rts.	Apr., 1902	8 7 6	8 10 0
Namaqua.....	94,331	2 0 0	3 6	Dec., 1903	2 15 0	3 0 0
*New Jagersfontein.	200,000	5 0 0	10 0	June, 1904	27 5 0	27 15 0
New Primrose.....	325,000	1 0 0	3 0	Aug., 1904	3 12 6	3 15 0
Rand.....	1,786,956	5	5 0	Aug., 1902	10 3 9	10 5 0
Robinson.....	750,000	5 0 0	6 0	Aug., 1904	9 5 0	9 10 0
Robinson Deep.....	950,006	1 0 0	3 0	Aug., 1904	5 7 6	5 10 0
Rose Deep.....	425,000	1 0 0	3 0	Aug., 1904	8 15 0	9 0 0
Salisbury.....	100,000	1 0 0	2 0	June, 1904	1 18 3	1 18 9
Village.....	400,000	1 0 0	4 0	July, 1904	6 10 0	6 15 0
Wemmer.....	80,000	1 0 0	12 6	July, 1904	11 0 0	11 10 0

*Ex-dividend.

LONDON (By Cable.)*

Company.	July 13 £.	s.	d.	July 20 £.	s.	d.	Company.	July 13 £.	s.	d.	July 20 £.	s.	d.
Anaconda.....	3	15	0	3	17	6	Esperanza.....	1	0	0	1	0	0
Camp Bird.....	1	7	9	1	7	0	Modderfontein....	8	8	9	8	4	4½
Con. Gold Fields.	6	0	0	5	16	3	Rand Mines.....	10	2	6	9	17	6
De Beers.....	18	7	6	18	15	0	Rio Tinto	53	2	6	53	15	0
East Rand.....	7	10	0	7	10	7½	Simmer & Jack...	1	11	3	1	9	4½
El Oro.....	1	3	9	1	3	0	Tomboy.....	1	3	9	1	3	9

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. June 30.

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Closing. Fr.
Anzin, Coal.....	France	20,000,000	500	200.00	5,824.00	5,565.00
Boleo, c.....	Lower Cal.....	12,000,000	500	104.17	1,872.00	1,825.00
Champ d'Or, g.....	S. Africa.....	3,375,000	25	3.75	18.75	18.75
Courrieres, Coal.....	France	600,000	500	110.00	2,880.00	2,940.00
Fraser River, g.....	Brit. Col.....	250,000	25	.....	5.50	5.50
Huanchaca, s.....	Bolivia.....	40,000,000	125	2.50	88.75	88.25
Laurium, z. l.....	Greece.....	16,300,000	500	25.00	318.00	310.00
Malfidano, z.....	Italy	12,500,000	500	50.00	580.00	580.00
Metaux, Cie. Fran. de.....	France.....	25,000,000	500	22.50	489.00	475.00
Mokta-el-Hadid, i. l.....	Algeria	18,312,000	500	40.00	368.00	915.00
Nickel, n.....	N. Caledonia..	15,000,000	250	22.50	580.50	557.00
Penarroya, Coal	Spain.....	.....	500	45.00	1,052.00	1,070.00
Vielle Montagne z.....	Belgium.....	9,000,000	30	30.00	680.00	634.00
.....	.....	.....	.....	.....	.....	.....

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd.,	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass	"	.04½@.05
Barry's Bav, Ont.,	"	.07½@.08½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03¼
Grains	"	.05@.05¼
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02¼
Crude, ex-ship N. Y.; Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h.gr.	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01¼
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02¼@.04¼
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10½@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.19
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal	2.47@2.49
Refined wood, 95@97%	"	60@65
Purified	"	1.25@1.30
ALUM—Lump	100 lbs.	1.75
Ground	"	1.85
Porous	"	1.00
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06¼
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20	"	.03¾
26°	"	.03¾
AMMONIUM—		
Carbonate, lump	"	.07¾
Powdered	"	.08¼
Muriate gram	"	.05½
Lump	"	.09¼
Nitrate, white pure (95%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.06¾@.07¾
Oxide, com'l white, 95%	"	.09¼
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.03@.03¼
Red	"	.06¾@.06¼
ASPHALTUM—		
Barbadoes	"	.02¼@.03
Cuban	lb.	.01¾@.03¼
Egyptian, crude	"	.06@.07
Gilsonite, Utah, ordin'y	lb.	.03
Select	"	.03¾
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21 00
Trinidad, refined	sh. ton	35.00
Ventura, Cal	sh. ton	32.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton	$25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.50 @1.70
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05¾
Sulphate (Blanc Fixe)	lb.	.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Snow-white	"	18.00
Foreign gray	"	13.50
Snow white	"	17.25
Floated	"	18.75
BAUXITE—Gn. or Ala. Mines:		
First grade	lg. ton	5.25@5.50
Second grade	"	4.50@4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03¼
"A"	"	.05
BONE ASH	"	.02¼@.02¼
BORAX	"	.07½@.07¾
BROMINE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.60
brown	"	1.10
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Carbonate, ppt	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.25@1.50
Foreign	"	1.75@2.25
"Rosendale," 300 lbs	"	.80
Slag cement,	"	.90@1.00
CERESINE—		
Orange and Yellow	lb.	.13¼
White	"	.15
CHALK—Lump, bulk	sh. ton	3.00
Ppt. per quality	lb.	.04@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% cb.) ex-ship N. Y.	lg. ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg. ton	8.25
Am. best, ex-dock, N. Y	"	9.25
English, common	"	10.75
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lbs.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (50% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16¼
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.12⅜@.12⅝
FELDSPAR—Ground	sh. ton	10.00
FLINT PEBBLES—		
Danish, Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh. ton	8.00@10.00
Ground	"	11.5(@13.50
FULLER'S EARTH—Lump	100 lbs.	$0.80
Powdered	"	.85
GRAPHITE—Am. f. o. b. Providence, R. I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
Ceylon, common pulv.	lb.	.02¾@.03¼
Best pulverized	"	.04@.08
German, com. pulv	"	.01¼@.01½
Best pulverized	"	.01½@.02
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l.	"	.01¼
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	lb.	.08½@.08¾
Brown	"	.06½@.06¾
Nitrate, com'l	"	.06½
gran	"	.08¼
LIME—Com., abt. 250 lbs	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece. Crude (95%)	lg. ton	5.00@5.50
Calcined	sh. ton	15.50
Bricks, best imp., f.o.b. N.Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	180@200
MAGNESIUM—		
Carbonate, light, fine pd	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—		
Crude powd. 70@75% binoxide	lb.	.01¼@ 01¼
75@85% binoxide	"	.01¼@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05¼
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.12@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.71
MICA—N. Y. gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00¾@.02
Sheets are sold as to size and quality.		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr. 25@30, cold test	gal.	.11@.12
15, cold test	"	.12@.13
Zero	"	.16¼@.17½
Summer	"	.11@.12
Cylinder, dark steam ref	"	.13¼@.14
Dark, filtered	"	.16¼@.17¼
Light, filtered	"	.18¼@.19¼
Extra cold test	"	.23@.30
Gasoline, 86 @90°	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.41@.44
Boiled	"	.46
Calcutta, raw	"	.65
OZOKERITE	lb.	.11½
PAINTS AND COLORS— Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	10¾
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd.	"	.05½@.06
English Glassmakers'	"	.08¼@.08¾
Lithophone	"	.02½@.06¼
Metallic, brown	sh. ton	19.00
Red	"	16 00
Ocher. Am. common	"	8.50@9.00
Best	"	21.25@25.00
Dutch, washed	lb.	.02½
French, washed	"	.01¼@.01⅞
Orange mineral, Am	"	.07¾@.07¾
Foreign, as to make	"	.08¼@.10¼
Paris green, pure, bulk	"	.11
PAINTS AND COLORS— Red lead, American	lb	$0.06¼@$0.06¼
Foreign	"	.07@.08¼
Turpentine, spirits	gal.	.57
White lead, Am., dry	lb.	.05@.05¼
American, in oil	"	.06@.06½
Foreign, in oil	"	.09 @.09¼
Zinc, white, Am., ex. dry	"	.04¾@.04¾
Foreign, red seal, dry	"	.06@.08¼
Green seal, dry	"	.05½@.09½
POTASH—		
Caustic, ordinary	"	.04½@.04¾
Elect. (90%)	"	.05¾
POTASSIUM—		
Bicarbonate cryst	"	.08½
Powdered or gran	"	.14
Bichromate, Am	"	.08½@.08¾
Scotch	"	98¾@.08¾
Bromide	"	@.50
Carbonate (80@85%)	"	3.50@4 00
Chlorate, powdered	"	.06¾@.07½
Crystals	"	.06½@.07
Chromate	"	.35
Cyanide (98@99%)	"	.19@.20
Kainit	lg. ton	9.30
Manure salt, 20%	100 lbs.	.66
Double Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.80
95%	"	1.86
Permanganate	lb.	.09½@.09¾
Prussiate, yellow	"	.14¾@.14¾
Red	"	.36 @.38¾
Sulphate, 90%	100 lbs	2.11
96%	"	2.14
Sylvinit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine 280 lbs.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lbs	3.40@3.70
Refined	"	4.00@4 50
SILICA— Ground quartz, ord'y	sh. ton	9.00@10.00
Best	"	12.00 @13.00
Lump quartz	"	2 50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.36½
Oxide	"	.85@1.10
SODIUM— Bicarb., ord., bulk f.o.b. works	100 lbs.	1 30
Extra domes., f. o. b. works	"	3.50
Bichromate	lb.	.06⅜
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.75½
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 70@76%, f. o. b. works	"	1.75@1.85
Foreign, f.o.b N. Y.	"	1.90@1.95
Chlorate, com'l	"	.06¾@.06¾
Hyposulphite, Am	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot and nearby	"	2.12½@2.15
Shipments	"	2.20
Peroxide	lb.	.45
Phosphate	"	.02½@.02¾
Prussiate	"	.09¾
Sal soda, f.o.b. works	100 lbs.	.90
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	.82½
Sulphide, crystals, bbl.	lb.	.01¾
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	2.10
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade	sh. ton	20.00
N. Y., Fibrous, best	"	10.25
French, best	100 lbs.	2.50
Italian, best	"	2.25
TAR—Regular	bbl.	2.25
Oil, bbl	"	5 00
TIN—Crystals, bbl	lb.	.17
Oxide	"	.55
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.07½
Carbonate, ppt	"	.09
Chloride solution, com'l	"	.02¾
Chloride granular	"	.04¾@.4 4¾
Dust	"	.05½@.05⅝
Sulphate	"	.02 @.02¼

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07¾ @.08¼
THORIUM—Nitrate 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.